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BULLETIN

OF THE

BUFFALO SOCIETY OF NATURAL SCIENCES.

VOLUME I.

I. Description of New North American Moths

BY AUG. R. GROTE.

In the present Article I announce the fact that new species of the Lepidopterous Genera Hemaris, Leucania, Phasiane, Tortrix, Conchylis, are discovered in our Fauna, and that two new genera, Mellilla and Lomanaltes, occur within its limits. It has been objected to such studies as these, that they are of the Closet and not of the Field. Already one has been who made this distinction in his own favor. Still, I think the student at his books and dead specimens is the same whom we meet again, where grasses grow, collecting and observing. So the Field is brought to the House with the Harvest, and can be rightly spoken of from the Closet. It will at least profit others little to be unable properly to tell what one has seen. It is no excuse that we have been out of door when we are called upon to speak. To some the form which the student uses, that he may be well understood, may seem uninteresting, and his statement dry. But from his record is gathered at last a Truth that every one may enjoy. So, often, the seed is dry, but the plant is full of sap. Perhaps it must be dry at first, to be properly green thereafter. This is

the age of objective research, as contrasted with that past in objectless complaint. Let us, then, see what we can while we live. Let us mellow our lives to our Harvest time, that then, like a perfect fruit, we may show in us the soil, the dew, the rain and the sunbeam, and so fall at last good and sweet into the hands of the Husbandman.

Family **SPHINGIDAE.**

Genus **Hemaris,** *Dalman* (1816).

It is Fabricius who, in 1793, arranges under the generic name *Sesia,* a number of moths which have for a common character the more or less pellucid wings. However, the moths thus early brought together belonged to two distinct structural groups—families in the Latreillean sense. In 1807, Fabricius restricts the term *Sesia* to members of the family under present consideration—the Sphingidae, and proposes the term *Aegeria,* for the group afterwards known, it seems to me properly, as Aegeriidae by the English Entomologists. This restriction is overlooked on the continent of Europe, where the term *Sesia* has been generally, and I must believe incorrectly, used as equivalent to Aegeria, *Fabr.* But under the generic term *Sesia,* in the Systema Glossatorum (1807), Fabricius arranges a *number* of species, which are properly the types of distinct genera, according to our present acceptation. Among these species is the European *fuciformis,* for which the term *Sesia* has been retained by English writers, and is used in 1865 by ourselves for congeneric American forms. It is overlooked that Dalman has taken S. fuciformis as the type of his genus Hemaris, and that this name, having priority over the subsequent restrictions of Fabricius' term, must be retained for this type.

I have elsewhere proposed to restrict Cephonodes, *Hübner* (1816), to the Asiatic C. hylas; the type, so far as we can judge, of Hübner's genus; certainly the first species enumerated in the "Verzeichniss" under the name. Following Latreille's restriction, we must regard the European *Sphinx Stellatarum L.,* as the type of Scopoli's genus

Macroglossum. Our nearest known ally to this European genus is, perhaps, Euproserpinus phaeton, *Grote and Robinson*, from California.

In North America we have a number of pellucid winged Sphingidae, which, as a group, differ from our present idea of Hemaris, by their flattened form, appressed squamation, and longer wings. These we have arranged under the genus Haemorrhagia, *G. & R.*, of which our common Sesia thysbe, *Fab.*, is the type. Alexander Agassiz, in his recent superb "Revision of the Echini," speaks of our present knowledge of genera, as limited to convenient headings for the identification of species. The species for which I use the name Hemaris, are black and yellow bodied, more or less fuzzy; they look like Humble-bees. On the other hand, the species of Haemorrhagia are Indian red and olive, with flattened body hairs, and by their form prepare us for the still more compressedly shaped species of the genus Aellopos. The late Mr. Robinson and myself, in our Systematic Catalogue of North American Sphingidae, p. 24, have defined under "Sesia," the structural idea I here retain under the more correct name of Hemaris.

As was the case with Hemorrhagia, in which we discovered that several distinct species existed on the Atlantic Slope, whereas but one, or at the utmost two, had been previously suspected, so I have now to draw attention to the fact that a nearly parallel state of things exists with regard to the species of Hemaris.

The first illustration of a North American species of Hemaris is by Abbot & Smith, in 1797. They illustrate and describe a species from Georgia, under the name of *fuciformis*. Whatever species they intended is comparatively of little moment, since the name they use is the same as that under which the European species was described, and they were wrong in considering the two as identical. Boisduval is the next to figure, in the "Species Général," our Hemaris diffinis (*Macroglossa diffinis*, Boisd.) from the Atlantic District. Without any idea of the existence of cotemporary species, Harris considers, and Clemens agrees, without obvious point, that H. diffinis is the species intended originally by Abbot. Boisduval is probably the originator of this idea, since quite recently, in the Annales de la Société Entomologique de Belgique, this distinguished Author indulges in even wider speculations with regard to the work on the Insects of Georgia, and unnecessarily troubles himself with

discoveries which the American student had already made and recorded.

The next species of Hemaris described is from California. This is Hemaris Thetis (*Macroglossa Thetis*, Boisd.), illustrated by ourselves on Plate 6, Vol. 1 of the Transactions of the American Entomological Society. A third species, Hemaris axillaris (*Sesia axillaris*, Grote and Robinson), is described by ourselves in 1868 from Texas.

As in Haemorrhagia, good specific differences are also to be found in the shape, size and comparative width, of the band on the external margin of the primaries in the species of Hemaris. The inner edge of this band in H. diffinis is very slightly roundedly and evenly exserted or scalloped on the interspaces. This character is shown in Boisduval's figure, with which specimens before me from Massachusetts to Pennsylvania otherwise sufficiently agree, and is decisive of what species is really intended. I do not think that either Clemens or Harris have mistaken Boisduval's and our most common species, so that a redescription is unnecessary. But I here indicate the existence of two new species in our territory, that may be separated from H. diffinis, by the shape and comparative width of the marginal band. We must remember H. diffinis as a species of good size, the apex of the primaries with a red stain on the marginal band, and with the inner edge of this marginal band improminently lunulate, neither dentate, nor perfectly even. The dark scale patch on the internal margin of the hind wings is usually stained with red in H. diffinis.

Hemaris tenuis, *Grote*, Plate 1, fig. 6, primary wing.

♂ ♀.—Pale yellowish and black. The two bluish white lateral abdominal spots evident against the blackish hairs of the basal segments, which latter are dorsally yellow. Anal tuft black, divided by yellow central hairs. Beneath, some sparse yellow hair overlies the usual black abdominal vestiture. Legs black; pectus pale yellowish white; palpi above black, beneath pale yellowish. Wings largely vitreous, with very narrow, dull blackish borders; blackish at base as usual, and partially overlaid with yellowish scales. Costal edging narrow; the band along external margin is even on its inner edge and narrower throughout than in any species hitherto described from the Atlantic District. There is no perceptible red apical shading. The body squamation is rather rough, and in size it is the smallest of our species yet described. The

external margins of the wings are more rounded and full than in any of our other known species of Hemaris.

Expanse, 1.50 inch. *Length of body*, .80 inch.

Through Mr. Strecker I have received specimens from West Farms, N. Y., and Berks County, Pennsylvania.

Hemaris Thetis, *Grote,* Plate 1, fig. 7, primary wing.

Macroglossa Thetis, Boisduval, Ann. Soc. Ent. Fr. t. 3, troisieme Ser. Bull., p. 32, 1855.

Sesia thetis, Grote and Robinson, Trans. Am. Ent. Soc. Vol. 1, Plate 6, 1868.

This species is from California. It is larger than H. tenuis. The marginal band of the primaries is even, black and very narrow. The costal edge is depressed and the external margin of the fore wings is more oblique, uneven and longer than in H. tenuis. There is no apical stain on the marginal band of the primaries. The more robust Californian species may also be distinguished apparently by the details of the abdominal coloration. It is described and illustrated in Number 3 of our Descriptions of North American Lepidoptera, as above cited. Our specimen expands 1.80 inch. A figure of the fore wing is given here for comparison.

Hemaris diffinis, *Grote,* Plate 1, fig. 8, primary wing.

Macroglossa diffinis, Boisduval, Sp. Gen. Plate 15, fig. 2, 1836.

Sesia diffinis, Harris, Silliman's Journal, Vol. 36, p. 308, 1839.

? Sphinx fuciformis, Smith, His. Ga., Vol. 1, p. 85, Plate 43, 1797.

This species occurs in Canada, and at various localities in the New England and Middle States. It may be considered infrequent in the vicinity of Buffalo. Mr. Zesch has, however, taken it as it hovered in day time about blossoms. My artist and my friend, Mr. Henry S. Sprague, gives a figure of the fore wing so that it may be compared with the other species here illustrated. In one example, received from Mr. Strecker, where the lunulation of the external band is hardly perceptible above, the character may be detected on the under surface.

A considerable number of specimens examined by me expand 1.75 to 1.85 inch, and average about an inch in length of body as near as may be.

Hemaris marginalis, *Grote,* Plate 2, fig. 10. ♀.

Thorax above yellowish shading to olivaceous, the squamation becoming deep yellowish over the basal abdominal segments dorsally. Middle abdominal segments black; the two pre-anal deep yellowish. Anal tuft black with central yellowish hairs; beneath, the abdomen is black, the yellowish hairs of the preanal segments extending downwardly at the sides. Legs black; anterior pair with pale scales along the tarsi and tibiae inwardly. Thorax beneath sulphur white. The body seems narrower, more fusiform than in the other species and the squamation more depressed. Wings largely vitreous, ornamented as usual, but with a wider terminal band on the primaries than is possessed by H. diffinis. The inner edge of this marginal band is plainly dentate inwardly on the superior interspaces. There is a reddish apical stain as in H. diffinis.

Expanse, 1.65 to 1.70 inch. *Length of body,* .95 inch.

Both sexes of this species have been obligingly communicated to me from Michigan by Mr. Herman Strecker. This is smaller, but otherwise closely allied to H. axillaris, *Grote,* from Texas.

Hemaris axillaris, *Grote,* Plate 1, fig. 9, primary wing.

Sesia axillaris, Grote and Robinson, Trans. Am. Ent. Soc., Vol. 1, p. 23, 1868.

This species differs from H. marginalis by the much wider and more strongly dentate marginal band of the fore wings, exhibited in the present illustration. It is our most robust species. It is from Texas. On its discovery we expressed our views of the sequence of the species of the genera Hemaris (Sesia), and Haemorrhagia, which should be modified, since the examination of all the new species here described, in so far, that we are now decidedly unwilling to reunite them in a single genus, and disposed to insist on the retention of Haemorrhagia as a distinct structural type. I desire to express my obligations to Mr. Theo. L. Mead for the kind manner in which he has placed my types of this species at my present disposition. They passed into the possession of the Central Park Museum, with the large collections of the late Mr. Coleman T. Robinson and myself, at Mr. Robinson's desire.

Genus **Haemorrhagia,** *Grote and Robinson* (1865).

In the Annals of the Lyceum of Natural History of New York, Vol. VIII., 1867, we gave a synoptical table of the species of this genus, which I here repeat in a more complete shape, adding our recently described Haemorrhagia uniformis (*Sesia uniformis* G. & R.) from the Atlantic District. Mr. Lintner writes me that this is the more usual species about Albany. Mr. Strecker kindly sends me a female specimen from Labrador. This species is of the size of H. thysbe, but may be known at once by the edendate inner edge of the marginal band, inwardly produced at vein 5. We speak of this species on page 26 of our Systematic Catalogue. It is the *ruficaudis* ‡ of Walker, but not of Kirby, to judge from the latter's description, which will not apply to any species of Hemaris or Haemorrhagia known to us. I owe to the kindness of Mr. Lintner, whose entomological labors I highly appreciate, specimens of H. gracilis, *G. & R.*, taken near Albany, N. Y. This is our rarest species and the slightest bodied. In fresh specimens there is a narrow white inner lining above and below to the marginal bands of the wings, which is alike singular and beautiful. It has many distinguishing features, as will appear in the following synoptic table of the species of this genus. The first species known to science allied to Haem. thysbe, and differing by the edentate margin of the fore wings, is Haem. buffaloensis, *G. & R.* In Buffalo, where also we take H. uniformis and H. thysbe, Mr. Reinecke and Mr. Zesch have reared Haem. buffaloensis from the egg and observed it in all its stages. It makes a very slight cocoon on the surface of the ground. The chrysalis has no exterior independent tongue case. In its growth, as well as in the habits of the perfect moth, we see, that Haemorrhagia presents resemblances to the Hesperidae, and we can be sure that its Group outranks the Family. Mr. Lintner has published full observations on the young stages of Haem. buffaloensis in the interesting Reports on the State Cabinet; the species has also occurred near Albany.

I owe to the obliging disposition of Mr. Strecker, of Reading, Penn., an opportunity of examining a single specimen of H. thysbe, from Pennsylvania, in which the pre-anal segments are almost entirely red, with only a few lateral olive colored hairs. I think it

possible, then, that H. fuscicaudis is only a form of H. thysbe; but I have no authentic specimens of the former species for comparison

The following is a table of our species of Haemorrhagia:

GROUP I. (*Chamaesesia.*)

Discal cell of primaries free. Vitreous field of secondaries crossed by five nervules. Sp. 1.

Thorax beneath, with lateral red shades; hind wings beneath with a pale shade at anal angle,..... 1. **Haem. gracilis,** *G. & R.*

GROUP II. (*Haemorrhagia.*)

Discal cell of primaries crossed by a longitudinal bar of scales, appearing as a prolongation of vein 5. Vitreous field of secondaries crossed by six nervules. Sp. 2 to 6.

A. Inner edge of external marginal band of the fore wings not dentate on the interspaces. Sp. 2 to 4.

Size small. (Expanse 1.65 to 1.70 inch)..... 2. **Haem. Buffaloensis,** *G. & R.*
Size moderate. (Expanse 1.80 to 2.20 inch). 3. **Haem. uniformis,** *Grote.*
Size large. (Expanse, ♂, 2.40 inch)..... 4. **Haem. Floridensis,** *G. & R.*

B. Inner edge of external marginal band of the fore wings dentate on the interspaces. Sp. 5 and 6.

Abdomen with the pre-anal segments olivaceous, 5. **Haem. Thysbe,** (*G. & R.*)
Abdomen terminally entirely deep red,..... 6. **Haem. fuscicaudis,**(*Boisd.*)

v. Heinemann, in his "Schmetterlinge Deutschlands und der Schweiz," p. 142, says, that the discal cell of the primaries is crossed by a prolongation of vein 5, in the European Hemaris bombyliformis. On examination I find, that in all our species, as well as in the European, where the cell of the primaries is not free, it is crossed by a line of scales continuous with vein 5, but the vein itself is thrown off as usual; it is not prolonged inwardly, as stated by the German Entomologist.

Family **NOCTUIDAE.**

Leucania Harveyi, *Grote*, Plate 1, fig. 14, primary wing.

♂ ♀.—The fore wings are rather narrow, with straight costal edge and hardly oblique exterior margin. They are pale ochrey, with a gray costal shade, which picks out the nervules. A black dot at the extremity of the cell. The median nervure is striped with white scales which extend partially along the median nervules, that are else marked with gray. At base the white stripe broadens below the nervure and is edged inferiorly by a distinct black line. Medially, below median nervure, the submedian interspace is gray limited below by a second curved dark line. A third dark streak edges the median nervure below, between the origin of second and third nervules. Between the fourth and fifth nervules there is a faint interspaceal streak and cuneiform dark marks precede the gray terminal space, which is cut off obliquely to apex. A fine terminal line; fringes pale. Collar whitish, with a dark bordering line; tegulae with a white streak. Head, thorax and appendages pale, somewhat olivaceous ochrey. Hind wings smoky, blackish, with whitish fringes, without marks. Beneath, pale with powdered dark scales; nervules dark. Sometimes the median nervure on the primaries is darker shaded above on the cell, and the subterminal marks are variably guttate and distinct.

Expanse, 1.20 to 1.30 inch. *Habitat,* Buffalo, N. Y., etc.

A common species in the Eastern and Middle States. It is probably described by Guenée as L. albilinea, *Hübner*. A reference to Hübner's original illustration, Zutraege, figs. 337 to 338, of a species with uneven costal edge, pale apical shade and produced apices, from Buenos Ayres, gives abundant reason to reject Guenée's determination, while the assumption that Hübner is mistaken in his locality, seems gratuitous. Guenée himself doubted his determination of our species, for, referring to some discrepancies between Hübner's figure and the material before him from the United States, he asks: Serait-ce une espèce distincte?

To Dr. Leon F. Harvey, of Buffalo, who is studying this Family of Moths, and whom I thank for his kind personal interest, I dedicate this species.

Leucania Henrici, *Grote,* Plate 1, fig. 15, primary wing.

The wings are long and wide; primaries with the costal edge nearly straight, slightly arcuated to the depressedly acute apices; external margin oblique; internal angle full and rounded. The fore wings above are marked with longitudinal shades. There are no traces whatever of the ordinary spots or lines. All the veins are picked out by whitish gray scales and the interspaces streaked with olivaceous ochrey. This latter darker shade obtains prominently and broadly from the base of the wing, below median nervure on the submedian interspace centrally, to the external margin, before which it is attenuate, leaving the submedian fold marked by gray scales, and the region along the internal margin of the wing, above and below the internal nervure, gray with scattered darker scales. The interspaces between the second and fourth veins have central gray shades. Again the deep olivaceous ochrey color extends along the discal cell, margining the median nervure superiorly, attenuate at base and widening to external margin on both sides of the fifth vein, which is as usual brought into relief by pale scales. Again the darker shade is more prominently perceivable on the post-apical interspace between veins 7 and 8; a short trigonate shade. A subobsolete series of dots at the base of the white fringes. Hind wings white. Beneath, whitish with costal dustings of darker scales on both wings; a faint terminal row of dark marks. Thorax beneath olivaceous ochrey, as are the legs inwardly; outwardly the tibiae and tarsi are whitish gray and contrast. Antennae rather short and stout, simple, testaceous. Palpi exceeding slightly the front. Head and thorax above gray; abdomen exceeding the hind wings, rather long.

Expanse, 1.50 inch. *Habitat,* New York State.

Both sexes of this species are before me. Its neutral tints are distinct and their contrasts on the primaries strong. It cannot be confounded easily with any of our described species on account of the shape and breadth of the primaries, the simplicity of the markings and the contrast of the tints. In the shape of the wings this species resembles Meliana.

I name the present species after my friend Mr. Henry S. Sprague, to whose talent in drawing the present Article owes much value.

Leucania evanida, *Grote,* Plate 1, fig. 16, primary wing.

♂.—Allied to L. Henrici, but differs by its narrower wings; the primaries have the costal edge straighter; about internal angle the wing is not so full, less roundedly produced; the internal margin is straighter and the wing is less developed below the internal nervure. There is a great similarity be-

tween the species in the ornamentation and color, but everywhere the gray shades of L. Henrici are here obsolete, and the olivaceous tints on the primaries are wanting in L. evanida, in which the interspaceal shadings are simply ochreous. The fore wings are almost entirely pale ochreous, with the whitish veins and shadings less obvious and contrasting. The internal margin is ochreous in the present species while it is gray in L. Henrici. The labial palpi are shorter and do not so prominently exceed the front in L. evanida, which is the slighter of the two and but little exceeds the European L. pallens in size. Our species wants all dots or marks whatever on the primaries above. The fringes are immaculate.

Expanse, 1.45 inch. *Habitat*, Putnam Co., N. Y.

A single specimen has been taken by the late Mr. C. T. Robinson at Brewster's.

Caradrina miranda, *Grote.*

♀.—This is a slight species with narrow, glossy blackish primaries, their costal and internal margins straight. All markings are obliterate and hardly to be discerned. The ordinary lines are divaricate; the subterminal line is obsolete, indicated by very faint pale dots and preceding dashes. An obscure dark dot marks the orbicular; a pale dot on the cross vein preceded by a dark streak, the reniform. The wing and fringes are concolorous and in some lights there is nothing to disturb their unicolorous appearance. Thorax above a little darker; abdomen and under surface of body and the legs a little paler than primaries. Hind wings pellucid whitish, clouded with blackish along the external and costal margins, without discal mark, with an attenuate marginal line. Beneath both pair whitish; the fore wings are largely blackish superiorly and along external margin. The costal region of the hind wings is broadly, evenly and well definedly blackish.

Expanse, .90 to 1.00 inch. *Habitat*, New York State.

This species of which several specimens are contained in the collection of this Society, is pyraliform in appearance, reminding us somewhat of Aglossa. It appears to bear a certain resemblance to the European C. palustris, Herrich-Schaeffer, fig. 292. It resembles also generally, the figures 366 and 367 of the same Author.

Family **GEOMETRIDAE.**

Phasiane mellistrigata, *Grote,* Plate 1, fig. 11. ♀.

Labial palpi convergent, extended beyond the front, the minute third article naked. Antennae scaled, simple. Maxillae moderately stout. Vein 5 of the secondaries absent. Dark steel gray. Wings ample; primaries with straight costal edge, bluntly acuminate apices, external margin slightly rounded. Secondaries full, a very little depressed on external margin opposite the cell. Fore wings bright clean steel gray; a distinct even continued narrow, slightly oblique, bright ochreous transverse anterior line with a light preceding shade, discontinued superiorly. A dark discal streak, above which, on costa, the very indistinct median shade line is more distinctly incepted. A very distinct double bright ochreous transverse posterior line, followed by a distinct black shade and running from internal margin, a little unevenly and outwardly obliquely to vein 7, where it is arrested, connected with the costa by a narrow black line placed inwardly. Subterminal line appearing as a vague festooning outside of the black shade. A very fine terminal line appearing by interspaceal dots. Fringes concolorous. Hind wings a little paler, mottled, deepening in color outwardly, with a distinct median even once angulated dark line, and a fainter subterminal shade. Beneath, paler, mottled; the veins picked out by testaceous scales; the costal edge a little stained; markings improminent. Body concolorous. Hind tibiae with middle and terminal spurs.

Expanse, 1.10 inch. *Habitat,* Buffalo, N. Y.

We have only the female of this species in the collection.

Mellilla, n. g.

The body is narrow and linear; the abdomen as long as the secondaries, the internal angle of which it slightly exceeds. Labial palpi dependent, short, but little exceeding the front. No ocelli. Male antennae bipectinate; the pectinations are obtuse, and provided with setal hair; there are about eighteen pairs on each antennus, and they gradually decrease in length to the tip, where they become obsolete. Maxillae moderate. Wings long. Primaries with straight costal and parallel internal margins; external margin rounded, a little shorter than usual. Veins 3 and 4 thrown off together; 5 independent, equidistant between 4 and 6; 7 and 8 together from the extremity of the long and narrow accessory cell, 7 to external

margin before, 8 to costal margin just within the apex; 9 out of 8; 10 forming the upper limit of the accessory cell, (which is closed by a branchlet towards the base of 8 and 7,) and originating from the upper side of the median nervure; 11 out of 10 on the line of the costal nervure; 12 anastomosing with 10. Hind wings ovate, vein 5 wanting. Fringes short.

A genus of Geometridae allied to Fidonia.

Mellilla chamaechrysaria, *Grote,* Plate 1, fig. 1, ♂.

♂. Anterior wings basally pale brownish ochrey, sprinkled with dark brown scales. The perpendicular median shade is propinquitous to the even transverse exterior line, which limits inwardly the deep brown terminal field of the wing. This latter is deeper shaded along the apical region and with the line, becoming a little paler centrally on external margin. Hind wings deep orange above, without lines. Internal margin with black scales, which mark the inception of the usual transverse lines at anal angle. Beneath the fore wings are orange, with a terminal apical band. Hind wings pale brown, irrorate with dark scales and with a median transverse dark band.

Expanse, .75 inch. *Habitat,* Buffalo, N. Y., etc.

Mr. Charles Linden has taken specimens in this vicinity. I have seen this species singly in other collections of Moths, made at various points in the Atlantic States.

On the Plate, fig. 2 represents the under surface, and fig. 3 the denuded wings enlarged, showing the venation.

Family **PYRALIDAE.**

***Lomanaltes,** n. g.

Ocelli. Eyes naked. Maxillae moderate. Labial palpi elongate, projected straightly forward; second joint as long as the thorax; third joint longer than usual, obliquely porrected, closely scaled. Antennae simple, slender, finely ciliate inwardly. Fore wings elongate, produced apically; costal edge sinuate, uneven, medially depressed; external margin oblique; internal angle rounded and the

* Gr.: λῶμα et ἀναλθής.

margin shorter than usual. Venation like Hypena; primaries 12-veined: 3, 4 and 5 approximate; 4 nearer 5 at base; cell closed; an accessory cell, from the outer extremity of which 7 and 8 are thrown off from one point; 9 out of 8 to costa; 8 to apex; 10 out of the upper edge of the cell opposite the inception of 6. Hind wings moderately full and rounded, 8-veined; 5 arising within 3 and 4, independent, or connected by an aborted feeble veinlet with the median nervure. Hind tibiae with terminal and median spurs.

Lomanaltes laetulus, *Grote,* Plate 1, figs. 12, ♂.

Anterior wings dull olivaceous brown with a light purple cast. The dark color of the wing extends from the base to the outer median line, beyond this latter a very pale shade frosts the subterminal field and extends along costal region broadly to apices. Transverse anterior line even, nearly perpendicular, twice angulated, rusty ochreous with a pale preceding shade. Transverse posterior line similar in appearance, not angulated, even, oblique, followed by a pale shade. The inconspicuous discal dot is formed by raised scales. Subterminal line faint, irregular, indented opposite the cell and again at submedian interspace; the line itself is dark, picked out externally by pale points. Terminally the wing is again dark below the pale apical region; fringes dark. Hind wings fuscous, without markings, touched with whitish at anal angle; fringes darker. Beneath the wings are fuscous; secondaries paler; discal dots perceivable. On the primaries a white dot on the interspace between 7 and 8 and the costal nervules are faintly indicated by pale scales. Head and appendages and thorax concolorous with fore wings; the third palpal joint is tipped with pale scales. Under the glass there is an admixture of pale scales overlying the primaries and body parts. Abdomen slender, with feeble dorsal tufts, no longer than internal margin of secondaries.

Expanse, 1.10 inch. *Habitat,* Philadelphia; Albany, N. Y.—(Lintner.)

This genus is allied to Hypena and Bomolocha. From either it strongly differs in the shape of the primaries: their sinuate costal edge, apical production and oblique and extended external margin. The relative length and position of the third palpal article are peculiar. In the last of three Papers, partly treating of the North American Deltoids, to which the above genus belongs, I have enumerated twenty genera and fifty species as referable to the Group, which I follow the authors of the Wiener Verzeichniss in consider-

ing as belonging to the Pyralidae. The Group appears to me of subfamily value. Figure 13 gives an enlarged view of the extremity of the labial palpus, showing the position of the terminal joint in Lomanaltes.

Family **TORTRICIDAE.**

Tortrix Georgiana, *Grote,* Plate 1, fig. 4, primary wing.

Male antennae not basally constricted; all the nervules separated; costa of the primaries with a basal fold enclosing a hair pencil; vein 2 thrown off at outer two-thirds of the median nervure from the base to origin of vein 3. Hind wings with 3 and 4 thrown off together; also 6 and 7. Fore wings pale ochrey, with five transverse, irregular, nearly equidistant, perpendicular, ferruginous lines crossing the basal two-thirds of the wing; the outer fourth and fifth of these lines are joined on the submedian interspace by a crossing of similar scales. The second from the base divides at costa. On the outer third of the wing similar ferruginous scales form three disconnected angulate figures; two on the costal, one on the internal margin, that at the apex Y-shaped. Light purply shades on the ground color of the wing between the ferruginous markings. Hind wings dark fuscous with pale fringes; anal tuft prominent.

Habitat, Philadelphia (Bunte).

Tortrix Houstonana, *Grote,* Plate 1, fig. 5, primary wing.

No basal antennal constriction; fore wings 12 veined, all the veins separate; without (?) a costal fold. Hind wings slightly truncate; external margin uneven (wellenrandig); veins 3 and 4 thrown off together, short; 5 much removed; 6 and 7 together; 7 curved upwardly to apex. Hind tibiae with double spurs. Palpi thickly scaled, porrect, applied to the front. Fore wings pale ochreous, much taken up with ferruginous transverse irregular lines; between these the irregularly formed interspaces are filled out with different paler shades; at outer third the second and third transverse lines from the external margin are connected medially by a black blotch, and blackish scales are elsewhere intermixed on the lines. There is a plumbeous patch on submedian interspace and a smaller one beneath it on the margin, as well as others obliquely inwardly towards costa not prominent. The paler scales over the middle of the wing are slightly brilliant. Hind wings pale, slightly smoky, with paler fringes longer about anal angle and internal margin. In color this smaller species with rounded primaries resembles the preceding, but the

wing is darker, more blotchy and ferruginous. The longer fringes about anal angle of the hind wings remind one of Teras, to which I was at first disposed to refer both species, but the point of departure of vein 2 on the fore wings and the straightness of the median nervure are opposed to the characters of that genus.

Habitat, Texas (Belfrage).

Conchylis straminoides, *Grote.*

The fore wings widen outwardly, lapping a little at internal angle. Pale soft ochreous, with a median olivaceous band on the fore wings which below appears as a very large and very intensely colored ferruginous spot taking up the inferior half of the band and resting on internal margin. The apical region is powdered with dark scales and the wing terminally shaded downwardly with olivaceous. The costa is also darker dotted at base. Thus there are indications of three darker transverse shades. Fringes pale. Beneath the primaries are dark fuscous, except along internal margin. Above, the hind wings are pale with a light fuscous shade; beneath with a sprinkling of fuscous scales about the costo-apical region. Labial palpi dependent.

Habitat, Buffalo, N. Y.

Resembles C. straminea of Europe and more distantly C. angulatana, *Robinson*, from this State.

II. Catalogue of the Sphingidae of North America.

SINCE the North American species of Sphingidae were enumerated in 1868, by the late Mr. Coleman T. Robinson and myself, a few additional species have been discovered in our Territory, and are here included. A very few generic changes have been also found necessary, and are here introduced. No authentic captures of Phil. Satellitia, or Dil. Brontes, have been reported from any part of our Territory. These were formerly retained among our species, for the reason that they occur near our southern borders, as also, partly, that some of our own species had been mistaken for them, as will in fact appear from an examination of synonymy here acknowledged. The geographical limits here accepted, and the signs used, are the same as those adopted in the List of the Lepidoptera of North America.

AUG. R. GROTE.

BUFFALO, *April* 21, 1873.

SPHINGIDAE.

Subfamily, **BOMBYLIAE** (*Hübner*).

Tribe, VULGARES (*Hübner*).

ARCTONOTUS, Boisduval (1852).

Type: Arctonotus lucidus, *Boisduval.*

lucidus, *Boisduval.*
California.

LEPISESIA, Grote (1865).

Type: Macroglossa flavofasciata, *Barnston MS.*

flavofasciata, *Grote.*
Macroglossa flavofasciata, Walker.
Canada.

HEMARIS, Dalman (1816).

Type: Sphinx fuciformis, *Linnaeus.*

Thetis, *Grote.*

Macroglossa Thetis, Boisduval.
Sesia thetis, Grote and Robinson.

California.

tenuis, *Grote.*
New York; Pennsylvania.

diffinis, *Grote.*

Macroglossa diffinis, Boisduval.
Sesia diffinis, Harris.
? Sphinx fuciformis, ‡ Smith.

Canada; New York; Pennsylvania.

marginalis, *Grote.*
Michigan.

axillaris, *Grote.*

Sesia axillaris, Grote and Robinson.

Texas.

HAEMORRHAGIA, Grote and Robinson (1865).

Type: Sesia Thysbe, *Fabricius.*

§ Chamaesesia, *Grote.*

gracilis, *Grote and Robinson.*
Canada; New York.

§ Haemorrhagia, *Grote and Robinson.*

Buffaloensis, *Grote and Robinson.*
New York.

uniformis, *Grote.*

Sesia ruficaudis, ‡ Walker.
Sesia uniformis, Grote and Robinson.

Labrador; Canada; New York; Pennsylvania.

Floridensis, *Grote and Robinson.*
Florida.

Thysbe, *Grote and Robinson.*

Sesia Thysbe, Fabricius.

Sphinx pelasgus, Cramer.

? Sesia cimbiciformis, Stephens.

? Sesia ruficaudis, Kirby.

Massachusetts; New York; Pennsylvania.

fuscicaudis (*Walker*). ——

Macroglossa fuscicaudis, Boisduval MS.

Georgia (Abbot).

AELLOPOS, Hübner (1816).

Type: Sphinx Titan, *Cramer.*

Titan, *Hübner.*

Sphinx Titan, Cramer.

Macroglossum annulosum, Swainson.

Macroglossa balteata, Kirtland.

Ohio; Texas.

Tantalus, *Hübner.*

Sphinx Tantalus, Linnaeus.

Sphinx zonata, Drury.

Texas.

EUPROSERPINUS, Grote and Robinson (1865).

Type: Euproserpinus Phaeton, *Grote and Robinson.*

Phaeton, *Grote and Robinson.*

Macroglossa Erato, Boisduval.

California.

Tribe, AEQUIVOCAE (*Hübner*).

THYREUS, Swainson (1821).

Type: Thyreus Abbotii, *Swainson*

Abbotii, *Swainson.*

Massachusetts; New York; Pennsylvania.

AMPHION, Hübner (1816).

Type: Sphinx Nessus, *Cramer.*

Nessus, *Hübner.*

Sphinx Nessus, Cramer.

Canada; New York; Pennsylvania.

ENYO, Hübner (1816).

Type: Sphinx lugubris, *Linnaeus.*

lugubris, *Walker.*

Sphinx lugubris, Linnaeus.
Sphynx Fegeus, Cramer.
Enyo Phegeus, Hübner, Verzeichniss.
? Enyo lugubris, Hübner, Zutraege.[1]

Georgia; Alabama; Texas.

DEIDAMIA, Clemens (1859).

Type: Pterogon? inscriptum, *Harris.*

inscripta, *Clemens.*

Pterogon? inscriptum, Harris.
? Sphinx Japix, Cramer.

Massachusetts; New York; Pennsylvania.

PROSERPINUS, Hübner (1816).

Type: Sphinx Oenotherae, *Denis and Schifferlin.*

Clarkiae, *Clemens.*

Pterogon Clarkiae, Boisduval.

California.

Gaurae, *Hübner.*

Sphinx Gaurae, Abbot and Smith.

Georgia.

Subfamily **DEILEPHILAE** (*Hübner*).

Tribe, PALLIDIVENOSAE (*Hübner*).

DEILEPHILA, Ochsenheimer (1816).

Type: Sphinx livornica, *Esper.*

Chamaenerii, *Harris.*[2]

Sphinx epilobii, Harris MS.
Deilephila galii, ‡ Walker.
Deilephila canadensis, Guenée MS.
? Deilephila intermedia, Kirby.

Canada; Lake Superior; Massachusetts; New York; Pennsylvania.

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[1] This reference, I think, should be transferred to the synonymy of Enyo Gorgon; Dr. Herrich-Schaeffer, however, does not agree with me on this point.

[2] In 1865 I drew attention to certain characters, which I think readily distinguish our American species. M. Guenée (Annales de la Société Entomologique de France, 4iéme, Serie 8, p. 7) speaks of the distinguishing characters of D. chamaenerii as "très-suffisants." I am, therefore,

lineata, *Harris.*

Sphinx lineata, Fabricius (Syst. Ent. 1775).
Sphinx daueus, Cramer (Plate 125, D. 1779).

California ; Canada to Texas.

Tribe, ELEGANTES (*Hübner*).

DUPO, Hübner (1816.)

Vitis.

Sphinx vitis, Linnaeus, Drury, Fabricius, Denis and Schifferlin, Cramer (267, C), Abbot and Smith, Westwood.
—— —— Merian (Plate 47, upper figure teste Linnaeus).
Sphinx fasciatus, Sulzer.
Dupo jussieuae, Hübner.
Philampelus vitis, Harris.
Philampelus vitis (larva), Clemens.
Philampelus jussieuae (imago) Clemens.
Philampelus fasciatus, Lucas.

New Jersey ; Southern States.

Linnei.

Sphinx vitis, ‡ Cramer (268, E).
Dupo vitis, ‡ Hübner, Verzeichniss.
Philampelus vitis, ‡ Walker, Herrich-Schaeffer.
Philampelus vitis, ‡ (imago), Clemens.

Alabama (Auth. Calverley).

PHILAMPELUS, Harris (1839).

Type: Daphne Pandorus, *Hübner.*

Pandorus, Walker.

Daphne Pandorus, Hübner.
Philampelus satellitia, ‡ Harris.
Philampelus ampelophaga, Boisduval MS.
? Sphinx satellitia Fabricius, Drury (not of Linnaeus).

Massachusetts; New York; Pennsylvania.

Achemon, *Harris.*

Sphinx Achemon, Drury.
Sphinx Crantor, Cramer.

Massachusetts ; New York ; Pennsylvania ; Southern States.

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not agreed with a certain hasty opinion to the contrary, in the pages of the Canadian Entomologist, expressed by Mr. Herman Strecker. M. Guenée conjectures that the description of Deilephila Oxybaphi, *Clemens,* an apocryphal species, is based on a larva of Deilephila chamaenerii.

PACHYLIA, Walker (1856).

Type: Sphinx ficus, *Linnaeus.*

Lyncea, *Clemens.* ——
Texas.

ARGEUS, Hübner (1816).

Type: Sphinx Labruscae, *Linnaeus.*

Labruscae, *Hübner.*
Sphinx Labruscae, Linnaeus.
New Jersey; Philadelphia (Auth. C. A. Blake).

Tribe, OBLIQUOSTRIATAE (*Hübner*).

METOPSILUS, Duncan (1852).

Type: Sphinx Tersa, *Linnaeus.*

Tersa, *Duncan.*
Sphinx Tersa, Linnaeus.
Canada to Texas.

(?) **Procne** (Clemens). ——
California (Auth. Clemens).

Tribe, UNCINNATI (*Hübner*).

DARAPSA, Walker (1856).

Type: Sphinx Choerilus, *Cramer.*

Choerilus, *Walker.*
Sphinx Choerilus, Cramer.
Sphinx Azaleae, Abbot and Smith.
Massachusetts; New York; Southern States.

versicolor, *Clemens.*
Choerocampa versicolor, Harris.
Massachusetts; New York (Buffalo).

Myron, Walker.
Sphinx Myron, Cramer.
Sphinx pampinatrix, Abbot and Smith.
Otus Cnotus, Hübner.
Canada; New York; Southern States.

Subfamily **SMERINTHI** (*Hübner*).

Tribe, ANGULATI *Hübner*.

PAONIAS, Hübner (1816).

Type: Sphinx excaecatus, *Abbot and Smith*.

excaecatus, *Hübner*.

Sphinx excaecatus, Abbot and Smith.

Canada; Massachusetts; New York; Southern States.

pavoninus, *Geyer*. ——

Pennsylvania (Auth. Geyer). *An spec. praec.?*

myops, *Hübner*.

Sphinx myops, Abbot and Smith.
Smerinthus rosacaerum, Boisduval.

New York; Pennsylvania; Southern States.

CALASYMBOLUS,[3] Grote (1873).

Type: Sphinx Astylus, *Drury*.

Astylus.

Sphinx Astylus, Drury.
Sphinx Io, Boisduval.
Smerinthus integerrima, Harris.

Massachusetts; New York; Pennsylvania.

SMERINTHUS, Latreille (1809).

Type: Sphinx ocellatus, *Linnaeus*.

ophthalmicus, *Boisduval*.

California.

geminatus, *Say*.

Canada; Massachusetts; New York; Pennsylvania.

Cerisii, *Kirby*.[4]

Hudson's Bay Territory (Kennicott).

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[3] Gr.: καλῶ et ἀσύμβολος. The genus differs from Paonias in the shape of the secondaries, and from Smerinthus in antennal structure.

[4] I regret to differ entirely from the conclusions reached by Mr. Lintner, in an interesting article on the variation of Smerinthus geminatus (Entomological Contribution II). I think also that in no event should Drury's name be brought into use for our common species, since his illustration is discordant. I learn from Mr. Strecker that a specimen referable to this genus has been received from the Isthmus. Mr. Lintner's reasons for referring Drury's and Kirby's illustrations to S. geminatus must be conceded, I think, to be partly speculative. In 1865 I satisfied myself that Kirby's figure was faithful and his species valid.

Tribe: DENTATAE (*Hübner*).

LAOTHOE, *Fabricius* restr. (1807).

Type: Sphinx Populi, *Linnaeus.*

modesta.

Smerinthus modesta, Harris.
Smerinthus princeps, Walker.

Lake Superior; Canada; Massachusetts; New York.

CRESSONIA, *Grote and Robinson* (1865).

Type: Sphinx juglandis, *Abbot and Smith.*

juglandis, *Grote and Robinson.*

Sphinx juglandis, Abbot and Smith.

Canada; Massachusetts; New York; Southern States.

Subfamily, **MANDUCAE,** (*Hübner*).

Tribe, PONDEROSAE (*Hübner*).

CERATOMIA, Harris (1839).

Type: Agrius Amyntor, *Hübner.*

Amyntor, *Grote and Robinson.*

Agrius Amyntor, Hübner.
Ceratomia quadricornis, Harris.

Canada; Massachusetts; New York; Pennsylvania; Michigan.

DAREMMA, Walker (1856).

Type: Daremma undulosa, *Walker.*

undulosa, *Walker.*

Sphinx Brontes, ‡ Boisduval, Species Général.
Macrosila Brontes? Walker.
Ceratomia repentinus, Clemens.

Connecticut; New York; Pennsylvania; Michigan.

DILUDIA, Grote and Robinson (1865).

Type: Sphinx Brontes (*Drury*), Grote.

Jasminearum, *Grote and Robinson.*

Sphinx jasminearum, Boisduval.

New York; Pennsylvania.

leucophaeata (*Clemens*). ———

Texas (Auth. Clemens).

MACROSILA, Walker emend. (1856).

Type: Sphinx rustica, *Fabricius.*

rustica, *Walker.*

Sphinx rustica, Fabricius.

Sphinx chionanthi, Abbot and Smith.

Pennsylvania; Virginia; Southern States.

Carolina, *Clemens.*

Sphinx carolina, Linnaeus.

Massuchusetts; New York; Pennsylvania; Southern States.

Celeus, *Grote and Robinson.*

Phlegothontius Celeus, Hübner.

Sphinx quinquemaculata, Stephens.

Sphinx carolina, ‡ Donovan.

Canada; Massachusetts; New York; Pennsylvania.

Cingulata, *Clemens.*[5]

Sphinx cingulata, Fabricius.

Sphinx Druroci, Donovan.

Sphinx convolvuli, ‡ Abbot and Smith.

New York; Pennsylvania; Southern States.

SPHINX, Linnaeus restr. (1758).

Type: Sphinx ligustri, *Linnaeus.*

Drupiferarum, *Abbott and Smith.*

Canada; New York; Pennsylvania; Southern States.

Kalmiae, *Abbot and Smith.*

Canada; New York; Pennsylvania; Southern States.

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[5] The European Sphinx convolvuli falls in after our M. cingulata, and belongs to Macrosila. See Grote and Robinson, Annals New York Lyceum, Vol. 8, 1866.

Chersis, *Grote and Robinson.*

Lethia chersis, Hübner.

Sphinx cinerea, Harris.

Canada; Massachusetts; New York: Pennsylvania.

LETHIA, Hübner restr. (1816).

Type: Sphinx Gordius, *Cramer.*

Gordius, Hübner.

Sphinx Gordius, Cramer.

Canada; New York; Pennsylvania.

luscitiosa.

Sphinx luscitiosa, Clemens.

New York; Wisconsin.

AGRIUS,[6] Hübner restr. (1820).

Type: Agrius eremitus, *Hübner.*

eremitus, *Hübner.*

Sphinx sordida, Harris.

Massachusetts; New York; Pennsylvania; Wisconsin.

lugens.

Sphinx lugens, Walker.

Texas.

DOLBA, Walker (1856).

Type: Sphinx Hylaeus, *Drury.*

Hylaeus, *Walker.*

Sphinx Hylaeus, Drury.

Sphinx Prini, Abbot and Smith.

Massachusetts; New York; Pennsylvania; Southern States.

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[6] I accept Mr. Lintner's restriction of Hübner's generic term with pleasure. The name cannot be used for any of the species included under it in the Verzeichniss. I have hitherto neglected to observe the structure of this and allied forms.

Tribe, LEVES (*Hübner*).

DILOPHONOTA, Burmeister (1856).

Type: Sphinx Ello, *Linnaeus.*

Ello, *Burmeister.*

Sphinx Ello, Linnaeus.

New York; Pennsylvania; Southern States.

obscura, *Grote and Robinson.*

Sphinx obscura, Fabricius.
? Erinnyis Stheno, Hübner.

Pennsylvania.

HYLOICUS, Hübner (1816).

Type: Sphinx pinastri, *Linnaeus.*

Sequoiae (*Boisduval*).

California.

Strobi (*Boisduval*).

California?

plebeia, *Grote.*

Sphinx plebeia, Fabricius.

Massachusetts; New York; Pennsylvania.

ELLEMA, Clemens (1859).

Type: Ellema Harrisii, *Clemens.*

Coniferarum.

Sphinx coniferarum, Abbot and Smith.

Georgia.

Harrisii, *Clemens.*

Sphinx coniferarum, ‡ Harris.

Canada; Massachusetts; New York.

Pineum, *Lintner.*

Canada (?); New York State.

LAPARA,[7] Walker (1856).

Type: Lapara bombycoides, *Walker.*

bombycoides, *Walker.* ——
Canada (Auth. Walker).

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[7] A critical comparison between specimens of Ellema Harrisii and a figure of Lapara bombycoides, executed in England, convinces me that the two species, if distinct, cannot be separated by any uncomparative description. The fore wings in the drawing of L. bombycoides seem narrower, with the external margin quite oblique, the apices more produced. So also the external prominent dentatedly lunulate transverse band is more oblique, and its representation in the picture gives it a more even general course; whereas in Ellema Harrisii it is a little outwardly bent opposite the cell, and there is a depression at submedian interspace. The hind wings appear a little more rounded and the head more sunken in the drawing. But in every detail of size, color and characteristic marking, there is so great a correspondence between the two that I am inclined to believe that the drawing represents an individual of E. Harrisii, and I hope an occasion will be soon offered for sending specimens of Ellema Harrisii to London for verification.

Hyloicus and Ellema appear to me to recall, sufficiently strongly as to be noticed, certain European Bombycidae, such as Dendrolimus pini, which are considered by some authors as typical of the latter family, but which have apparently no American representatives.

III. Catalogue of the Zygaenidae of North America.

Since the publication in the "List," of the North American Zygaenidae in 1868, by the late Coleman T. Robinson and myself, several new forms have been described by Dr. A. S. Packard, Jr., and Mr. Richard H. Stretch. In the valuable work of the latter Author, now appearing in Parts, are also several suggestions in relation to the synonymy of certain species, which I here adopt. In the Fourth Annual Report of the Trustees of the Peabody Academy of Science, Dr. Packard suggests that Eupsychoma geometrica, *Grote*, from Colorado, is the same or rather a variety of Nemeophila petrosa, *Walker*. I have described and figured two species of Nemeophila from California, and also examined Mr. Walker's types of the genus in the British Museum. My type of Eupsychoma is in the collection of the American Entomological Society, and I did not have it with me in 1867 for comparison when in London. It differs from Mr. Walker's type and description by the immaculate secondaries, and it is broader winged. Dr. Packard's remarks show me, however, that I have probably erroneously referred the species to the present family in 1865, and it is here excluded. From what we already know of the distribution of this Family, we may expect the discovery of many more species from Southern California, the South-western Territories and Texas. In my Notes on the Zygaenidae of Cuba, 1866, I have drawn comparison between the profusional intertropical representation of the Family and this limited number, both of genera and species which appear as inhabitants of the Atlantic District, where the Bombycidae are the prevailing element. In the present "Catalogue" all species not occurring within the Faunal limits embraced by Dr. Le Conte's List of the Coleoptera are omitted.

Aug. R. Grote.

Buffalo, *April* 28, 1873.

ZYGAENIDAE.

Subfamily **HESPERI-SPHINGES,** *Latreille.*

Tribe, ALYPIINI, *Grote.*

ALYPIA, Hübner (1816).

Type: Zygaena 8-maculata, *Fabricius.*

§ Androloma.[1]

Lorquinii, *Grote and Robinson.*
California; Colorado Territory.

similis, *Stretch.* ——
California.

MacCullochii, *Kirby.*
Nevada; Canada; Nova Scotia.

Ridingsii, *Grote.*
Colorado Territory; Nevada; California.

Brannani, *Stretch.* ——
California.

§ Alypia.

Dipsaci, *Grote and Robinson.*
California.

Sacramenti, *Grote and Robinson.*
California.

octomaculata, *Hübner.*

Zygaena octomaculata, Fabricius.
♀ *Alypia octomaculalis,* Hübner.
♂ *Alypia quadriguttalis,* Hübner.
Phalaena albomaculata, Cramer.

Anticosti Island; Massachusetts; New York; Pennsylvania.

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[1]Gr.: *ἀνδρίον* et *λωμα.* I include in this section the species with a drum-like expansion of the costa in the male. The type is Alypia Lorquinii.

Langtonii, *Couper.*

Alypia octomaculata, ‡ [2]Walker (in part).

Canada; New York; Pennsylvania.

Mariposa, *Grote and Robinson.*

California.

lunata, *Stretch.* ——

California.

Grotei (*Boisduval*). ——

? Agarista bimaculata, Herrich-Schaeffer, fig. 26.

California.

Tribe, PSYCHOMORPHINI, *Grote.*

PSYCHOMORPHA, Harris (1839).

Type: Noctua Epimenis, *Drury.*

Epimenis, *Harris.*

Noctua Epimenis, Drury.

Massachusetts; New York; Pennsylvania.

Tribe, EUDRIINI, *Grote.*

EUSCIRRHOPTERUS, Grote (1866).

Type: Euscirrhopterus Poeyi, *Grote.*

Gloveri, *Grote.*

Texas.

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[2] While Mr. Walker, in the British Museum Lists, refers Canadian specimens of A. Langtonii to A. 8-maculata, I think it probable that Mr. Couper describes the latter species as the male of A. Langtonii. This supposition, however, becomes unlikely when we see that Mr. Couper quotes my letter describing the male A. 8-maculata, with which he is unacquainted, in the same Paper. If Mr. Couper is correct, we have to do with a species in which, while the female has but a single spot on the hind wings, the male has two spots, like A. 8-maculata. But I think I have both sexes of A. Langtonii agreeing with Mr. Couper's original illustration. A mistake is the more likely to have happened, since Mr. Couper compares his species, in the first instance, with A. MacCullochii, *Kirby*, instead of with A. 8-maculata. Kirby gives the color of the spots on both wings in his species as white. Both Kirby's very good figure and a specimen before me from Owen's Lake, Nevada, show a sulphur tinge on both wings, though more decidedly on the primaries. A. Langtonii ♀ has also the spots concolorous on either wing, and it is probably only in A. 8-maculata that the spots on the primaries are sulphur yellow and on the hind wings white. Now that we have also a Californian species described with all the spots white, our remark as to the correspondence in the color of the spots between the species of Alypia inhabiting the same Faunal District, becomes incorrect.

EUDRYAS, Boisduval (1836).

Type: Euthisanotia unio, *Hübner.*

brevipennis, *Stretch.* ——
California (Auth. Stretch).

unio, *Boisduval.*

Euthisanotia unio, Hübner.

Canada; Massachusetts; New York; Pennsylvania.

grata, *Harris.*

Bombyx grata, Fabricius.

Canada; Vermont; Massachusetts; New York.

Subfamily **GLAUCOPES** (*Hübner*).

Tribe, HORAMINI, *Grote.*

HORAMA, Hübner (1816).

Type: Sphinx Pretus, *Cramer.*

Texana, *Grote.*

Horomia plumipes, ‡ Clemens.

Texas.

Tribe, HYALINAE (*Hübner*).

LAEMOCHARIS, Herrich-Schaeffer (1850).

Type: Laemocharis Pertyi, *Boisduval MS.*

Pertyi, *Herrich-Schaeffer.* ——
Georgia.

COSMOSOMA, Hübner (1820).

Type: Cosmosoma Omphale, *Hübner.*

Omphale, *Hübner.*

Georgia; Alabama; Florida; Texas.

SYNTOMEIDA, Harris (1839).

Type: Syntomeida Ipomaeae, *Harris.*

Ipomaeae, *Harris.* ——

Glaucopis Euterpe, Herrich-Schaeffer, fig. 430.

? Euchromia ferox, Walker.

Georgia.

Tribe, CTENUCHINI, *Grote.*

SCEPSIS, *Walker* (1854).

Type: Glaucopis fulvicollis, *Hübner.*

fulvicollis, *Walker.*

Glaucopis fulvicollis, Hübner.
Glaucopis semidiaphana, Harris.
Scepsis Packardii, Grote.[3]

California; Maine to Florida.

CTENUCHA, Kirby (1837).

Type: Ctenucha Latreillana, *Kirby.*

§ Ctenucha.

Virginica, *Grote.*

Sphinx Virginica, Charpentier.
Ctenucha Latreillana, Kirby.

Canada; Maine; New York (Buffalo).

Cressonana, *Grote.*

Colorado Territory.

§ Euctenucha.[4]

ochroscapus, *Grote and Robinson.*

Ctenucha corvina, Boisduval.

California.

multifaria, *Grote and Robinson.*

Apistosia? multifaria, Walker.
Glaucopis rubroscapus, Ménétriés.

California.

Robinsonii, *Boisduval.* ——

California.

Harrisii, *Boisduval.* ——

California.

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[3] Mr. Stretch considers the Californian S. Packardii, as not specifically distinct from our Eastern S. fulvicollis.

[4] Gr.: "Ev et Ctenucha. The type of this section is Ctenucha multifaria. For the structural peculiarities of the Californian species, see Trans. Am. Ent. Soc., Vol 1, p. 330.

brunnea, *Stretch.* ——
California.

§ Philoros, *Walker.*

venosa, *Walker.*
Texas.

PYGARCTIA, Grote (1871).

Type: Pygarctia abdominalis, *Grote.*

abdominalis, *Grote.*
Alabama.

Tribe, VARIEGATAE (*Hübner*).

GNOPHAELA, Walker (1854).

Type: Dioptis aequinoctialis, *Walker.*

vermiculata, *Grote and Robinson.*

Callalucia vermiculata, Grote.

Colorado Territory.

Hopfferi, *Grote and Robinson.*
California; Oregon.

latipennis (*Boisduval*). ——
California.

Tribe, IMMACULATAE (*Hübner*).

ACOLOITHUS, Clemens (1860).

Type: Acoloithus falsarius, *Clemens.*

falsarius, *Clemens.*

Harrisina Sanborni, Packard.

Pennsylvania; New York; Illinois.

HARRISINA, Packard (1864).

Type: Procris Americana, *Harris.*

Americana, *Packard.*

Procris Americana, Harris.

Massachusetts; New York; Pennsylvania.

Texana, *Stretch.* ——
Texas.

coracina, *Packard.*

Aglaope coracina, Clemens.

Texas.

TRIPROCRIS,[5] *Grote* (1873).

Type: Procris? Smithsonianus, *Clemens.*

Smithsonianus.

Procris? Smithsonianus, Clemens.

Texas.

Tribe, PYROMORPHINA (*Herrich-Schaeffer*).

PYROMORPHA, Herrich-Schaeffer (1850).

Type: Pyromorpha dimidiata, *H.-S.*

dimidiata, *Herrich-Schaeffer.*

Malthaca perlucidula, Clemens.

? Lycomorpha centralis, Walker.

New York; Pennsylvania; Illinois.

Tribe, LYCOMORPHINI, *Grote.*

LYCOMORPHA, Harris (1839).

Type: Sphinx Pholus, *Drury*

Pholus, *Harris.*

Sphinx Pholus, Drury.

Canada; Maine; New York; Pennsylvania.

miniata, *Packard.* ——
Southern California.

Palmerii, *Packard.* ——
Arizona.

[5] The diagnosis of this genus is given by Dr. Clemens, in the Proceedings of the Academy of Natural Science of Philadelphia for 1860, page 540, under the name "*Procris?*."

ANATOLMIS, *Packard* (1864).

Type: Anatolmis Grotei, *Packard.*

Grotei, *Packard.*
Colorado Territory.

Subfamily **CYDOSIINAE,** *Grote.*

Tribe, CYDOSIINI, *Grote.*

CYDOSIA, Westwood.

Type: Phalaena nobilitella, *Cramer.*

aurivitta, *Grote and Robinson.*
Texas.

imitella,[6] *Stretch.*
Texas.

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[6] On a comparison with Cuban and South American specimens of C. nobilitella, the Texan species is seen to be distinct, as suggested by Mr. Stretch in his conscientious work on the Bombycidae and Zygaenidae, page 163. It is, however, not unlikely that the two names here cited refer to a single species.

IV. Conclusions drawn from a study of the Genera Hypena and Herminia

BY AUG. R. GROTE.

I HAVE recently identified M. Guenée's descriptions of North American Deltoids in a series of Papers contained in the Fourth Volume of the Transactions of the American Entomological Society. To the third Paper I have given a list of our species. I have endeavored to separate as accurately as my ability, and the material as yet placed at my disposal, would allow me, a number of species which might be loosely classed under Schrank's genus Hypena.

I have considered Hypena as restricted by Hübner in 1816. Hübner cites under this name the European species, *Palpalis*, *Decimalis*, *Obsitalis*, and *Rostralis*. The genus thus corresponds with Lederer's second Group of Hypena, and is typically represented in our Fauna by Hypena Humuli, *Harris*. In this species the compressedly elongated labial palpi extend much beyond the head, and are as long, or nearly as long as the thorax; the third joint is continuous and shortly scaled. The primary wings are narrow and crambiform, without a lappet at internal angle. Our species are HYPENA EVANIDALIS, *Robinson*, and HYPENA HUMULI, *Harris*, from the Eastern and Middle States, and HYPENA CITATA, *Grote*, from Alabama.

I would follow this genus by our common species from the Atlantic District, the *Hyblaea scabra* of Fabricius, in which the still narrow wings swell suddenly at outer third, and are developed at internal angle somewhat as in Pseudothyatira, Plusia or even Conchylis, and have a sinuate internal margin. The third joint of the palpi is neither so shortly scaled, so continuous, nor so long as in Hypena. An exceedingly valuable communication made to me by Mr. Lintner discovers the fact that M. Guenée's *Hypena erectalis* is the female form of this species. There is then a sexual character

in the breadth of the hind wings, which are disproportionately ample in the male. I propose for the species the name PLATHYPENA[1] SCABRA. Lederer agrees with Hübner in a generic separation of the European *crassalis*, under the name Bomolocha. In this genus the costal edge is arcuate or even, much as in Plathypena, but the internal margin of the primaries is straight. Through the kindness of Mr. Lintner, Mr. Meske sends me a specimen taken near Albany, which seems to be the European *crassalis*, and differs from *Baltimoralis* in the absence of the peculiar neck-like constriction of the median space inferiorly. Our congeneric species are: BOMOLOCHA BALTIMORALIS (Guenée), BOMOLOCHA ABALIENALIS (Walker), BOMOLOCHA MANALIS (Walker), BOMOLOCHA BIJUGALIS (Walker), and BOMOLOCHA MADEFACTALIS (Guenée). Differing from this genus by the sinuate or depressed costal margin of the primaries, which are acute at the apices and produced on external margin opposite the middle, as well as by the more ample concolorous wings, woolly body scales and stouter build, we have two species from the Atlantic District which I separate from the foregoing under the name MACRHYPENA.[2] The type is *Hypena deceptalis*, Walker. Our species are MACRHYPENA DECEPTALIS, and MACRHYPENA PROFECTA (Grote). We may follow these by LOMANALTES LAETULUS, *Grote*, which differs by the oblique external margin of the primaries and essentially in their shape.

Two species from the Atlantic District are conspicuous by their even shape and dead black color, hardly relieved by pale scale marks. All the angles of the primaries are softened; the wings are shorter and broader; the eyes larger; the whole appearance more noctuiform. I have described these under Hypena. They appear to me most nearly related to Bomolocha, but the palpi are very short. They may be known as EUHYPENA[3] TOREUTA (Grote), and EUHYPENA SORDIDULA (Grote).

Latrielle seems at first to have used his term Herminia in a synonymous sense with Hypena, or indeed as embracing the whole Group of Deltoids. Treitschke limits it to a number of European species among which is the European *Pyralis tentacularis*, Linnaeus. Hübner and Stephens have accepted many genera for

[1]Gr.: πλᾰτίς et Hypena. [2]Gr.: μᾰκρός et Hypena. [3]Gr.: Ἐυ et Hypena.

Treitschke's species of Herminia. It seems to me we may do justice to all their observations and restrict Herminia to a genus of which Herminia tentacularis would be the type. Schrank's term, *Polypogon*, it must be remembered, is preoccupied and must be abandoned. Hübner's term, Paracolax, is restricted by Stephens to the European *derivalis, nemoralis* and *tarsicrinalis*. Stephens' restriction of Macrochilo, *Hübner*, to the European *cribralis*, should apparently be followed. For our species, that appear to me congeneric with the European included by Lederer in his Group A of Zanclognatha, I use this term. There is an agreement in the curvature of the second palpal joint, the fore tibiae are provided with a fan-shaped brush capable of expansion, the species are rather heavy and the primaries seem narrow with straighter external margin than usual. Our North American species are ZANCLOGNATHA LAEVIGATA (Grote), ZANCLOGNATHA CRURALIS (Guenée), ZANCLOGNATHA MARCIDILINEA (Grote), ZANCLOGNATHA OBSCURIPENNIS (Grote), and ZANCLOGNATHA OCHREIPENNIS (Grote). For Guenée's Herminia morbidalis, I propose the term CHYTOLITA.[4] CHYTOLITA MORBIDALIS (Guenée), differs from Zanclognatha in the straight second palpal joint, and from Pechipogon in the shape of the wings and neuration as indicated by Guenée. It was a common species about Philadelphia and has been reported to me by Mr. J. A. Lintner as taken near Albany. It is easily recognized by the guttate subterminal line.

Rather resembling Chytolita in general appearance, but in reality nearer to Zanclognatha in the shape of the second palpal joint, is *Herminia pedipillalis* Guenée, for which I propose the generic term PITYOLITA.[5] As to how far this may be found to agree with any of the European species contained in Lederer's second Group of Zanclognatha, I am not clear, but in the incomplete brush on the fore tibiae, the frailer form and broader wings, it is easily separated from our species that I have arranged under Lederer's genus. There remains but to be noticed two species already described by myself under the name Philometra, and which, in some respects, have a resemblance to the European Herminia tentacularis. These two species just alluded to as under Philometra, agree remarkably in

[4]Gr.: χυτός et λιτος.

[5]Gr.: πιτύω et λιτος.

most of the structural characters I have been able to discover, but differ in the comparative length of the pectinations of the antennae. The species are PHILOMETRA LONGILABRIS, *Grote*, and PHILOMETRA SERRATICORNIS, *Grote*. I designate the former as the type of the genus. At the moment I prefer to separate the genera I have here discussed on other than antennal peculiarities.

I have received from Mr. Lintner some very curious examples of Zanclognatha laevigata, showing the excessive variability of this species. Sometimes the median space is dark, bronzed or purpled, sometimes clear when the base of the wing and the hind region are obscurely tinted. I have indicated the existence of these variational tendencies in my original description of the species which was made from large material.

V. Descriptions of New Species of Fungi

BY CHAS. H. PECK.

[*Read before this Society June 6th*, 1873.]

HYMENOMYCETES.

Agaricus (Amanita) russuloides, *Peck.*

Pileus at first ovate, then expanded or convex, rough with a few superficial warts or entirely smooth, viscid when moist, widely striate-tuberculate on the margin, pale yellow or straw color; lamellae close, free, narrowed toward the stem, white; stem firm, smooth, stuffed, annulate, equal or slightly tapering upward, bulbous; annulus thin, soon vanishing; volva fragile, subappressed; spores broadly elliptical, .0004′* long, .0003′ broad.

Plant 2′–3′ high, pileus 1.5′–2′ broad, stem 3″†–5″ thick.

Grassy ground in open woods. Greenbush, June. This species is remarkable for the thin striate-tuberculate margin of the pileus which causes it to resemble some species of Russula.

Agaricus (Lepiota) fuscosquameus, *Peck.*

Pileus hemispherical or convex, rough with numerous erect pointed blackish-brown scales; lamellae close, white, free; stem equal, thickened at the base, hollow or stuffed with a cottony pith, floccose, brown; spores .0003′ × .00014′.

Plant 2′–3′ high, pileus 1.5′–2′ broad, stem 3″ thick.

Ground in woods. Croghan. September.

Agaricus (Lepiota) oblitus, *Peck.*

Pileus convex or expanded, subumbonate, smooth or obscurely squamose from the breaking up of the veil, viscid, alutaceous inclining to tawny, the umbo generally darker; lamellae crowded, free, whitish or yellowish, some of

*One accent (′) = inch or inches. †Two accents (″) = line or lines.

them forked; stem equal or slightly tapering upward, floccose, viscid, smooth at the top, hollow or containing a cottony pith; annulus obsolete; spores .00016′ × .00012′.

Plant 2′–3′ high, pileus 2′–3′ broad, stem 3″ thick.

Ground in frondose woods. Lowville. September.

Agaricus (Armillaria) ponderosus, *Peck.*

Pileus thick, compact, convex or subcampanulate, smooth, white or yellowish, the naked margin strongly involute beneath the slightly viscid persistent veil; lamellae crowded, narrow, slightly emarginate, white inclining to cream color; stem stout, subequal, firm, solid, coated by the veil, colored like the pileus, white and furfuraceus above the annulus; flesh white; spores nearly globose, .00016′ in diameter.

Plant 4′–6′ high, pileus 4′–6′ broad, stem about 1′ thick.

Ground in woods. Copake. October.

The veil for a long time conceals the lamellae and finally becomes lacerated and adheres in shreds or fragments to the stem and margin of the pileus.

Agaricus (Tricholoma) rubicundus, *Peck.*

Pileus convex, then expanded or centrally depressed, viscid, slightly tomentose on the margin when young, smooth, or sometimes with a few scales either on the disk or on the margin, red; lamellae close, white, becoming spotted with red, some of them forked; stem firm, equal, solid, slightly pruinose, white, often stained with red; spores .00028′ × .00016′.

Plant 3′–5′ high, pileus 3′–5′ broad, stem 6″–8″ thick.

Ground in woods. New Scotland. October.

Agaricus (Tricholoma) flavescens, *Peck.*

Pileus firm, convex, often irregular, dry, smooth, sometimes cracking on the disk into minute scales, white or pale yellow, minutely tomentose on the margin when young; lamellae close, floccose on the edge, white or pale yellow; stem firm, solid, often unequal, central or eccentric, colored like the pileus; spores subglobose, .0002′ in diameter.

Plant caespitose, 2′–3′ high, pileus 2′–3′ broad, stem 4″–6″ thick.

Old pine stumps. Bethlehem and North Greenbush. October.

Agaricus (Tricholoma) decorosus, *Peck.*

Pileus firm, at first hemispherical, then convex or expanded, coated with numerous brownish subsquarrose tomentose scales, dull ochraceous or tawny; lamellae close, rounded and slightly emarginate at the inner extremity, the

edge subcrenulate; stem solid, equal or slightly tapering upward, white and smooth at the top, elsewhere tomentose, scaly and colored like the pileus; spores broadly elliptical, .0002′ × .00015′.

Plant subcaespitose, 2′–4′ high, pileus 1′–2′ broad, stem 2″–4″ thick.

Rotten logs in woods. Catskill Mountains and Rock City. September and October.

Agaricus (Tricholoma) multipunctus, *Peck.*

Pileus brittle, broadly convex, sometimes centrally depressed or subumbilicate, densely dotted with minute brown or blackish scales, yellowish-brown, the disk often darker; lamellae close, slightly emarginate, yellow, sometimes with a darker edge; stem subequal, squamulose-punctate, hollow, colored like the pileus; spores suborbicular, .00016′ in diameter.

Plant subcaespitose, 1′–2′ high, pileus 1′–2′ broad, stem 2″–4″ thick.

Rotten logs in woods. Sandlake and Adirondack Mountains. July and August.

This species is related to *Ag. rutilans.*

Agaricus (Tricholoma) lacunosus, *Peck.*

Pileus convex or expanded, dry, lacunose, densely furfuraceous, bright golden yellow; lamellae subdistant, white, the interspaces sometimes veiny; stem firm, solid, equal or slightly tapering downwards, scaly or furfuraceous, colored like the pileus.

Plant 1′–2′ high, pileus 1′ broad, stem 1″ thick.

Fallen branches and decaying wood. Savannah. August.

The colors are well retained in the dried specimens. The lacunae of the pileus give it a somewhat reticulated appearance.

Agaricus (Tricholoma) laterarius, *Peck.*

Pileus convex or expanded, sometimes slightly depressed in the center, pruinose, whitish, the disk often tinged with red or brown, the thin margin marked with slight subdistant short radiating ridges; lamellae narrow, crowded, white, prolonged in little decurrent lines on the stem; stem nearly equal, solid, white; spores globose, .00018′ in diameter.

Plant 3′–4′ high, pileus 2′–4′ broad, stem 3″–5″ thick.

Ground in woods. Worcester. July.

Agaricus (Tricholoma) Limonium, *Peck.*

Pileus thin, smooth, yellowish; lamellae crowded, narrow, not forming decurrent lines on the stem, lemon-yellow; stem tapering downwards, smooth, striate, rooting.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 3″–4″ thick.

Ground in woods. Worcester and Croghan. July and September.

The lemon color of the lamellae and the root-like prolongation of the stem characterize this species.

Agaricus (Tricholoma) virescens, *Peck.*

Pileus convex or expanded, sometimes depressed centrally, moist, smooth, dingy-green, the margin sometimes wavy or lobed; lamellae close, gradually narrowed toward the outer extremity, rounded or slightly emarginate at the inner, white; stem subequal, stuffed or hollow, thick but brittle, whitish, sometimes tinged with green; spores broadly elliptical, .0002′ × .00015′.

Plant 3′–5′ high, pileus 3′–5′ broad, stem 6″–12″ thick.

Mossy ground in open woods. North Elba. July.

Agaricus (Tricholoma) fumidellus, *Peck.*

Pileus subumbonate, smooth, moist, dingy-white or clay colored, clouded with brown; lamellae close, subventricose, whitish; stem equal, smooth, solid, whitish; spores, .00018′ × .00015′.

Plant 2′–3′ high, pileus 1′–2′ broad, stem 2″–3″ thick.

Ground in woods. New Scotland. October.

The disk is generally darker than the margin. The pileus becomes paler in drying. The stem splits easily.

Agaricus (Tricholoma) fallax, *Peck.*

Pileus firm, convex or expanded, rarely depressed in the center, moist, smooth, dull saffron color; lamellae crowded, narrow, tapering toward the outer extremity, rounded at the inner, yellow; stem short, smooth, stuffed or hollow, usually tapering toward the base, colored like the pileus; spores minute, subelliptical, .00012′ long.

Plant gregarious, 1′–1.5′ high, pileus 6″–15″ broad, stem 1″ thick.

Ground under spruce and balsam trees. North Elba. July.

Agaricus (Tricholoma) thujinus, *Peck.*

Pileus convex or centrally depressed, smooth, hygrophanous, pale alutaceous, the margin generally irregular, wavy or lobed; lamellae crowded, thin, abruptly emarginate, alutaceous; stem slightly thickened at the top, smooth, hollow, concolorous, whitish-villous at the base.

Plant 2′ high, pileus 2′ broad, stem 2″–3″ thick.

Swampy ground under *Thuja occidentalis.* Memphis. August.

Agaricus (Tricholoma) Hebeloma, *Peck.*

Pileus broadly conical or subcampanulate, obtuse, thin, hygrophanous, striatulate brown and dark on the disk when moist, grayish when dry ; lamellae broad, rounded behind and deeply emarginate, yellowish ; stem equal, hollow, smooth, pallid ; spores .00028′ × .00016′.

Plant 1′ high, pileus 6″ broad, stem scarcely 1″ thick.

Ground in woods. Worcester. July.

This plant closely resembles some species of the subgenus Hebeloma, but the color of its spores forbid its reference to that subgenus.

Agaricus (Clitocybe) connexus, *Peck.*

Pileus thin, subumbonate, clothed with a minute appressed silkiness, white, the margin sometimes faintly tinged with blue; lamellae crowded, narrow, white inclining to yellowish ; stem equal or tapering downwards, solid, whitish.

Plant 2′–3′ high, pileus 2′–3′ broad, stem 2″ thick.

Ground in woods. Croghan. September.

The lamellae are not strongly decurrent and sometimes terminate abruptly, hence it might easily be mistaken for a Tricholoma. The margin of the pileus is sometimes marked with slight ridges as in *Ag. laterarius.* The odor is weak but aromatic and agreeable.

Agaricus (Clitocybe) albissimus, *Peck.*

Pileus convex or expanded, dry, smooth, soft, pure white ; lamellae crowded, short-decurrent, white, some of them forked at the base ; stem equal, smooth, solid, white.

Plant growing in rings, 2′–3′ high, pileus 2′–3′ broad, stem 2″–3″ thick.

Ground in woods. Croghan. September.

The pure white color and soft texture is retained in the dried specimens.

Agaricus (Clitocybe) maculosus, *Peck.*

Pileus centrally depressed, smooth, marked with numerous watery spots when moist, having slight short radiating ridges on the margin; lamellae crowded, narrow, long-decurrent, pallid or yellowish, some of them forked ; stem slightly thickened at the base, smooth, stuffed or hollow, colored like the pileus.

Plant 2′–3′ high, pileus 1.5′–2′ broad, stem 2″–3″ thick.

Ground in woods. Croghan. September.

The spots of the pileus resemble those of *Ag. marmoreus.* They generally disappear as the plant becomes dry.

Agaricus (Clitocybe) Truncicola, *Peck.*

Pileus thin, firm, expanded or centrally depressed, smooth, dry, white; lamellae narrow, thin, crowded, adnate-decurrent; stem equal, stuffed, smooth, often eccentric and curved, whitish.

Plant 1′ high, pileus 1′ broad, stem 1″ thick.

Trunks of frondose trees, especially maples. Croghan. September.

Agaricus (Clitocybe) subzonalis, *Peck.*

Pileus thin, centrally depressed or subinfundibuliform, marked with two or three obscure zones, with a slight appressed silkiness, pale yellow; lamellae close, narrow, equally decurrent, some of them forked, pallid or yellowish; stem equal, slightly fibrillose, stuffed, pale yellow.

Plant 2′ high, pileus 2′–3′ broad, stem 2″–4″ thick.

Ground in woods. Croghan. September.

Agaricus (Clitocybe) Gerardianus, *Peck.*

Pileus thin, funnel-form, hygrophanous, striatulate when moist, brown, rough with scattered blackish points; lamellae decurrent, close, a little paler than the pileus, some of them forked; stem rather long, flexuous, smooth, stuffed, concolorous, white at the base.

Plant 2′–3′ high, pileus 8″–12″ broad, stem .5″–1″ thick.

Sphagnous marshes. Sandlake and New Paltz. June.

Agaricus (Collybia) coloreus, *Peck.*

Pileus convex, subumblicate, slightly fibrillose, hygrophanous, yellow, sometimes tinged with red, the margin exceeding the lamellae; lamellae moderately close, emarginate, yellow; stem equal, smooth, hollow, sometimes eccentric, yellow.

Plant 1′–2′ high, pileus 8″–12″ broad, stem 1″ thick.

Decaying wood. Croghan. September.

Agaricus (Collybia) succosus, *Peck.*

Pileus firm, convex or campanulate, minutely tomentose, cinereous or brownish-gray, the margin generally exceeding the lamellae; lamellae thin, close, emarginate and slightly decurrent-toothed, tapering toward the outer extremity, whitish; stem firm, equal or slightly tapering upward, minutely tomentose, containing a whitish pith; spores minute, subglobose, .00015′ in diameter; flesh subcartilaginous, abounding in a thin watery or serum-like juice, changing to purplish or black when cut.

Plant 1′–3′ high, pileus 6″–12″ broad, stem 1′ thick.

Decaying prostrate trunks of trees in woods. Portville and Croghan. September.

This is a very remarkable and somewhat aberrant species. In color it resembles dark forms of *Heydnum gelatinosum*. The stem is sometimes eccentric. The juice exudes from wounds as in species of *Lactarius*.

Agaricus (Collybia) myriadophyllus, *Peck.*

Pileus very thin, broadly convex, then expanded, sometimes umbilicate, hygroyhanous, watery-brown when moist, pale ochraceous or alutaceous when dry; lamellae very numerous, crowded, narrow, rounded at the stem and slightly emarginate, brownish-lilac; stem equal, smooth, stuffed, reddish-brown; spores subelliptical, minute, .00012′ long.

Plant subcaespitose, 1′–1.5′ high, pileus 8″–12″ broad, stem .5″ thick.

Decaying wood and fallen branches in woods. Portville. September.

The color of the lamellae is remarkable.

Agaricus (Mycena) subcaeruleus, *Peck.*

Pileus very thin, convex or campanulate, obtuse, smooth, striate, pale bluish-green; lamellae narrow, close, tapering outwardly, white; stem slender, equal, pinkish-white, slightly pruinose; spores subglobose, .00025′ in diameter.

Plant caespitose, 2′ high, pileus 4″–8″ broad.

Trunks of beech trees in woods. Adirondack Mountains. July.

The disk is more highly colored than the margin and the pileus has a separable cuticle.

Agaricus (Mycena) minutulus, *Peck.*

Pileus convex or campanulate, smooth, striatulate, papillate; lamellae broad, subdistant, with a slight decurrent tooth; interspaces reticulated by transverse veinlets which descend on the lamellae; stem short, slender, firm, smooth or sprinkled with minute mealy particles.

Plant gregarious, white throughout, 8″–12″ high, pileus 2″–4″ broad.

Bark of prostrate trunks in woods. Portville. September.

Agaricus (Mycena) roseocandidus, *Peck.*

Pileus convex or broadly campanulate, subpapillate, striate nearly to the apex, white or rosy-red; lamellae close, uncinate, colored like the pileus; stem slender, smooth, white.

Plant 2′ high, pileus 4″–6″ broad.

Among mosses in woods. Adirondack Mountains. July.

Usually the whole plant is pure white, but sometimes the pileus has a delicate rosy hue except on the apex and the margin. The striations of the pileus remain in the dried specimens. The papilla is sometimes very prominent, sometimes wanting.

Agaricus (Mycena) miratus, *Peck.*

Pileus thin, campanulate, umbilicate, smooth, striate, cinereous; lamellae narrow, slightly uncinate, whitish; stem long, filiform, smooth, whitish, radicating, villous at the base.

Plant 1.5′–2′ high, pileus 3″–4″ broad.

Among fallen leaves in copses. Center. October.

This species may be known by the umbilicate pileus and the long striae which extend to the umbilicus.

Agaricus (Omphalia) olivarius, *Peck.*

Pileus convex, umbilicate, smooth, yellowish-olive; lamellae arcuate, decurrent, subdistant, pale yellow; stem equal, short, smooth, hollow, colored like the pileus; spores subglobose or broadly elliptical, .00026′ long.

Plant 1′–1.5′ high, pileus 1′ broad, stem 1″ thick.

Burnt ground under balsam trees. North Elba. July.

Agaricus (Omphalia) rugosodiscus, *Peck.*

Pileus thin, convex, then expanded, smooth, hygrophanous, striatulate when moist, brown, rugose-wrinkled on the disk, the thin margin often wavy; lamellae narrow, close, arcuate, decurrent, white; stem equal, short, smooth, hollow, often curved, whitish.

Plant 1′–1.5′ high, pileus 6″–12″ broad, stem .5″ thick.

Decaying prostrate trunks of trees in woods. Croghan and Worcester. July and September.

Agaricus (Pluteus) sterilomarginatus, *Peck.*

Pileus broadly convex or expanded, with a slight appressed tomentum, white faintly tinged with pink, the thin margin exceeding the lamellae; lamellae close, subventricose, free, minutely eroded on the edge, pale flesh color; stem short, equal, solid, smooth, whitish; spores subglobose, angular, with a central nucleus, .00025′ in diameter.

Plant 1′ high, pileus 6″–12″ broad, stem .5″ thick.

Decaying woods and sticks in woods. Portville. September. The pileus is sometimes cracked and then has the appearance of being coated with a thin scaly paste.

Agaricus (Pluteus) granularis, *Peck.*

Pileus convex or expanded, subumbonate, rugose-wrinkled, sprinkled with minute blackish granules, varying in color from yellow to brown; lamellae rather broad, close, ventricose, free, whitish, then flesh-colored; stem equal, solid, pallid or brown, usually paler at the top, velvety, with a short close plush; spores subglobose, about .0002′ in diameter.

Plant 2′–3′ high, pileus 1′–2′ broad, stem 1″–2″ thick.

Old logs in woods. Pine Hill and Worcester. July.

The granules form a sort of plush which is more dense on the disk of the pileus and its wrinkles than on the margin.

Agaricus (Entoloma) cyaneus, *Peck.*

Pileus convex, dry, minutely scaly, brown or brownish-violaceus; lamellae whitish, then tinged with flesh color; stem subequal, hollow, scaly and violaceous toward the top; spores angular, .00033′ × 00025′.

Plant 2′ high, pileus 1′–1.5′ broad, stem 1″ thick.

Decaying wood and old mossy trunks in woods. Pine Hill and Worcester. June and July.

Agaricus (Leptonia) foliomarginatus, *Peck.*

Pileus convex, umbilicate, scabrous on the disk, bluish-brown, the disk a little darker; lamellae broad, subdistant, plane, whitish, then flesh-colored, the edge entire and colored like the pileus; stem smooth, equal, solid below, with a small cavity above, concolorous.

Plant 1′–2′ high, pileus 6″–10″ broad, stem .5″ thick.

Ground and decaying wood in groves. Maryland. July.

Agaricus (Nolanea) fuscofolius, *Peck.*

Pileus thin, conical or campanulate, papillate, smooth, hygrophanous, dark brown and striatulate when moist, grayish-brown and shining when dry; lamellae ascending, narrowed toward each end, brown; stem equal, stuffed, smooth, concolorous, with a white mycelium at the base; spores irregular, nucleate, .00033′ × .00025′.

Plant 1′ high, pileus 3″–6″ broad, stem 5″ thick.

In woods on old logs. Maryland. July.

Agaricus (Pholiota) albocrenulatus, *Peck.*

Pileus fleshy, firm, convex or campanulate, subumbonate, viscid, rough with dark-brown or blackish floccose scales, yellowish-brown; lamellae broad, subdistant, emarginate, white crenulate on the edge, grayish, then ferruginous;

stem firm, equal or slightly tapering upward, stuffed or hollow, squamose and pallid below the evanescent ring, white and slightly furfuraceous above; spores subelliptical, .00045′ × .00025′.

Plant 3′–5′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Mossy base of maple trees in woods. Adirondack Mountains. July and August.

Under a lens the lamellae appear to be beaded on the edge with minute milky globules.

Agaricus (Pholiota) Acericola, *Peck.*

Pileus broadly convex, glabrous, rugose-reticulated or corrugated, hygrophanous, yellow; lamellae close, emarginate, grayish, then ferruginous-brown; stem equal or thickened at the base, hollow, fibrillose-striate, white; annulus large; spores elliptical, .00035′ × .00025′.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Mossy trunks of maple trees in woods. North Elba. August.

Agaricus (Pholiota) discolor, *Peck.*

Pileus thin, convex, then expanded or slightly depressed, smooth, viscid hygrophanous, watery-cinnamon and striatulate on the margin when moist, bright ochraceous yellow when dry; lamellae close, narrow, pallid, then pale ferruginous; stem equal, hollow, fibrillose-striate, pallid; annulus distinct, persistent; spores elliptical, .00028′ × .0002′.

Plant subcaespitose, 2′–3′ high, pileus 8″–16″ broad, stem 1″ thick.

Old logs in woods. Greig. September.

The change in color when passing from the moist to the dry state is very marked.

Agaricus (Pholiota) cerasinus, *Peck.*

Pileus broadly convex, smooth, hygrophanus, watery-cinnamon when moist, yellow when dry; lamellae close, emarginate, yellow, then cinnamon color; stem solid, equal, often curved, furfuraceous at the top; annulus slight, fugacious; flesh yellow; spores elliptical, rough, .0003′ × .0002′.

Plant caespitose, 2′–4′ high, pileus 2′–4′ broad, stem 2′–4′ thick.

Old prostrate trunks of trees in woods. Sterling. August.

When fresh it has a strong cherry-like or amygdaline odor.

Agaricus (Hebeloma) pallidomarginatus, *Peck.*

Pileus brittle, broadly convex, sometimes irregular, smooth, hygrophanous, brown with a pale margin when moist, ochraceous and subatomaceous when dry; lamellae close, thin, rounded and slightly emarginate at the stem, taper-

ing outwardly, ochraceous-brown; stem usually long and flexuous; equal or tapering upward, hollow, a little paler than the pileus, white-floccose at the base; spores subelliptical, .0004′ × .0002′.

Plant gregarious 1′–3′ high, pileus 6″–12″ broad, stem 1″ thick.

Ground in swamps and wet places. Sandlake. September.

Agaricus (Hebeloma) stellatosporus, *Peck.*

Pileus convex, dry, rough with numerous squarrose or erect scales, brown; lamellae pallid becoming brown; stem equal, scaly, concolorous; spores subglobose, rough with little nodules, .0003′ in diameter.

Plant 2′ high, pileus 1′ broad, stem 1″ thick.

Ground in woods. Croghan. September.

This plant bears a close resemblance to *Ag. mutatus*, but the persistent scales and rough spores distinguish it.

Agaricus (Hebeloma) griseoscabrosus, *Peck.*

Pileus hemispherical or convex, dry, rough with scales and appressed fibres, cinereous, the margin whitish when young; lamellae close, broad, whitish, then ochraceous-brown; stem firm, solid, fibrillose or slightly scaly, subconcolorous; spores smooth, .00035′ × .0002′.

Plant gregarious, 1.5′–2′ high, pileus 6″–10″ broad, stem 1″–1.5″ thick.

Ground in open pine woods. Bethlehem. October.

Agaricus (Naucoria) bellulus, *Peck.*

Pileus thin, convex, moist, smooth, bright watery-cinnamon; lamellae crowded, narrow, emarginate, yellow, becoming darker with age; stem equal, hollow, often curved, smooth, reddish-brown; spores, .0002′ × .00014′.

Plant 1′ high, pileus 6″–12″ broad.

Decaying hemlock trunks in woods. Lowville and Sandlake. September.

It is sometimes caespitose. It is difficult to find a mature specimen of this plant in which the lamellae have not a stained or spotted appearance as if bitten by some small insect.

Agaricus (Naucoria) geminellus, *Peck.*

Pileus convex, even, firm, dry, yellowish-red, the margin paler; lamellae crowded, emarginate, pale yellow; stem equal, smooth, containing a white pith or a small cavity, colored like the pileus; flesh white; spores .00033′ × 0002′.

Rotten wood. Croghan. September.

The dimensions and habit are the same as in the last species, to which this is clearly related. Its lamellae also have the same peculiar appearance.

Agaricus (Naucoria) discomorbidus, *Peck.*

Pileus thin, convex or expanded, smooth, slightly viscid, reddish-brown or dull chestnut; lamellae narrow, crowded, minutely serrulate, white or pallid, then brownish; stem equal, stuffed, smooth, slightly mealy at the top, white; flesh white; spores nucleate, .0004′ × .00025′.

Plant 2′–3′ high, pileus 1′–1.5′ broad, stem 1″–2″ thick.

Ground in woods. Croghan and Copake. September and October.

In the dried specimens the disk has a dark discolored appearance as if beginning to decay.

Agaricus (Galera) expansus, *Peck.*

Pileus submembranaceous, expanded or depressed, viscid, plicate striate on the margin, brownish-ochre, sometimes tinged with yellow and pink hues; lamellae close, ferruginous; stem long, equal, hollow, slightly pruinose, faintly striate, yellow; spores .00045′ × .00028′.

Plant 3′–4′ high, pileus 1′ broad, stem 1″ thick.

Decaying wood. Sandlake and Memphis. August.

Agaricus (Galera) callistus, *Peck.*

Pileus thin, expanded, subumbonate, smooth, viscid, striatulate on the margin, olivaceous or ochraceous, the umbo or disk bright chestnut color; lamellae thin, close, ventricose, easily separating from the stem, yellowish, becoming bright ferruginous; stem equal, hollow, pruinose, yellow, spores .00035′ × .0002′.

Plant 1′–1.5′ high, pileus 6″–10″ broad, stem .5″ thick.

Exsiccated water-holes in wooded swamps. Croghan. September.

In the dried specimens the lamellae are white on the edge and the pileus has assumed a dull metallic green color.

Agaricus (Galera) Coprinoides, *Peck.*

Pileus membranaceous, soon expanded, often split on the margin, plicate-sulcate to the small even disk, yellowish inclining to ochre; lamellae close, slightly rounded behind, concolorous; stem equal, short, hollow, minutely hairy-pruinose, white; spores .00028′ × .0002′.

Plant 1′ high, pileus 6″ broad, stem .5″ thick.

Grassy ground. Sterling. August.

The appearance of the pileus is suggestive of some of the smaller Coprini.

Agaricus (Crepidotus) Herbarum, *Peck.*

Pileus thin, at first resupinate, with the margin incurved, clothed with white down, at length somewhat reflexed, less downy, the margin spreading; lamellae narrow, not crowded, diverging from a naked lateral or eccentric point, white, then tawny; spores slightly curved, .00028′ × .00014′.

Pileus 2″–4″ broad.

Dead stems of herbs. North Greenbush. October.

Agaricus (Psalliota) diminutivus, *Peck.*

Pileus expanded or centrally depressed, sometimes with a slight umbo, dry, alutaceous, the disk rosy-brown and spotted with small appressed silky scales; lamellae close, thin, free, ventricose, brownish-pink, becoming black; stem equal or slightly tapering upward, hollow or stuffed with a whitish pith, smooth, pallid; annulus thin, persistent, white; spores .0002′ × .00015′.

Plant 1.5′–2′ high, pileus 1′–1.5′ broad, stem 1″–2″ thick.

Ground in woods. Croghan. September.

Sometimes the whole pileus is reddish-brown. The flesh is quite brittle.

Agaricus (Stropharia) Howeanus, *Peck.*

Pileus convex, then expanded, fragile, smooth, subumbonate, yellowish; lamellae close, thin, rounded behind, eroded on the edge, whitish becoming ferruginous-brown; stem smooth, hollow, slightly thickened at the base; annulus thin, fugacious, sometimes adhering to the margin of the pileus; flesh white; spores .00033′ × .0002′.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 2″–4″ thick.

Center. June.

The surface of the pileus sometimes cracks into areas. The taste is bitter. The color of the spores is not a decided brown, and the plant might with almost equal propriety be referred to the subgenus Pholiota.

Agaricus (Hypholoma) hirtosquamulosus, *Peck.*

Pileus hairy-squamulose, hygrophanous, grayish-brown when moist, gray when dry; lamellae narrow, rounded at the stem, gray, then brown; stem short, firm, equal, hollow, slightly hairy-squamulose and colored like the pileus; spores subelliptical, nucleate, .00025′ long.

Plant 1′ high, pileus 6″–10″ broad, stem .5″ thick.

Prostrate trunks of maple trees in woods. Portville. September.

Agaricus (Hypholoma) phyllogenus, *Peck.*

Pileus firm, convex, sometimes slightly umbonate, hygrophanus, reddish-brown when moist, alutaceous when dry; lamellae plane, broad, close, brown, white on the edge; stem equal, fibrillose, stuffed or hollow, expanded at the base into a thin flat disk; spores pale-brown, subglobose, .0002′ in diameter.

Plant 8″–12″ high, pileus 2″–4″ broad, stem .5″ thick.

Fallen leaves in woods. Worcester. July.

This is a very small but distinct species, remarkable for the disk-like base of the stem by which it is attached to the leaves on which it grows.

Coprinus variegatus, *Peck.*

Pileus fleshy, fragile, oblong-ovate, then campanulate, obtuse, hygrophanous, pale watery-brown when moist, whitish or cream colored when dry, variegated by scales and patches of a superficial ochraceous tomentum, the margin finely striate; lamellae lanceolate, crowded, ascending, free, white, then rosy-brown, finally black; stem equal, brittle, hollow, white, at first peronate-annulate, then floccose-pruinose, with white branching root-like threads at the base; spores .00033′ long.

Plant densely caespitose, 3′–5′ high, pileus 1′–1.5′ broad, stem 2″–4″ thick.

Thin soil and decaying leaves covering rocks. Slope of Crows' Nest near West Point. June.

Allied to *C. atramentarius.* When young the whole plant is coated by an abundant superficial tomentum. This soon breaks up into loose scales or patches which peel off in flakes, revealing the smooth pileus beneath. The slight abrupt annulus soon vanishes.

Coprinus insignis, *Peck.*

Pileus campanulate, thin, sulcate-striate to the disk, grayish fawn-color, the smooth disk sometimes cracking into small areas or scales; lamellae ascending, crowded; stem hollow, slightly fibrillose, striate, white; spores rough, .0004′ × .00028′.

Plant 4′–5′ high, pileus 2′–3′ broad, stem 3″ thick.

About the roots of trees in woods. Worcester. July.

Coprinus angulatus, *Peck.*

Pileus thin, hemispherical or convex, plicate-sulcate, the disk smooth; lamellae subdistant, whitish, then black; stem equal, smooth, whitish; spores compressed, angular, subovate, .0004′ × .00033′.

Plant 1′–2′ high, pileus 6″–12″ broad, stem .5″ thick.

Woods. Croghan. September.

The specific name has reference to the angular character of the spores.

Cortinarius (Myxacium) sphaerosporus, *Peck.*

Pileus convex, smooth, very viscid, pale ochraceous; lamellae close, nearly plane, slightly emarginate, whitish, then cinnamon; stem tapering upward, solid, floccose, viscid, subconcolorous, white at the top; flesh white; spores nearly globose, about .0003′ in dameter.

Plant 2′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Ground in woods. Croghan. September.

Cortinarius (Phlegmacium) longipes, *Peck.*

Pileus convex or expanded, slightly fibrillose, viscid, yellowish or pale ochraceous; lamellae close, plane, brownish-olivaceous, then cinnamon; stem long, slightly fibrillose, tapering upwards, whitish.

Plant 6′ high, pileus 2′–3′ broad, stem 4″ thick.

Ground in woods. Croghan. September.

Cortinarius (Inoloma) lilacinus, *Peck.*

Pileus firm, hemispherical, then convex, minutely silky, lilac; lamellae close, lilac, then cinnamon; stem stout, bulbous, silky fibrillose, solid, whitish tinged with lilac; spores nucleate, .0004′ × .00025′.

Plant 4′–5′ high, pileus 3′ broad, stem 4″–6″ thick.

Low mossy ground in woods. Croghan. September.

Cortinarius (Inoloma) Clintonianus, *Peck.*

Pileus convex or expanded, with a few appressed silky fibrils, reddish-brown tinged with gray; lamellae close, dull violaceous, then cinnamon; stem solid, silky-fibrillose, tapering upwards, violaceous at the top; spores .0003′ × .00025′.

Plant 2′–3′ high, pileus 1′–2′ broad, stem 2″–3″ thick.

Ground in woods. Croghan and New Scotland. September.

Cortinarius (Inoloma) modestus, *Peck.*

Pileus convex or expanded, subfibrillose, even or slightly rugose-wrinkled, alutaceous; lamellae close, nearly plane, pallid, then cinnamon; stem bulbous, subfibrillose, hollow or with a white pith, concolorous; flesh white; spores .00033′ × .00025′.

Plant 2′ high, pileus 1′–1.5′ broad, stem 2″ thick.

Ground in woods. Croghan. September.

It is distinguished from the preceding species by its paler color, more bulbous stem, and the entire absence of violaceous hues in the lamellae.

Cortinarius (Telamonia) lignarius, *Peck.*

Pileus smooth, hygrophanous, dark watery cinnamon when moist, paler when dry; lamellae close, thin, concolorous, when young concealed by the copious white webby veil; stem equal, silky-fibrillose, hollow or with a whitish pith, subannulate, with a dense white mycelium at the base; spores .00028′ × .0002′

Plant subcaespitose, 1′–2′ high, pileus 8″–12″ broad, stem 1″ thick.

Rotten wood. Catskill mountains. June.

Cortinarius (Telamonia) nigrellus, *Peck.*

Pileus at first conical, then convex or expanded, obtuse or subumbonate, minutely silky, hygrophanous, blackish chestnut when moist, paler when dry; lamellae close, narrow, emarginate, brownish-ochre, then cinnamon; stem subequal, silky fibrillose, pallid, often flexuous; annulus slight, evanescent; spores .00028′ × 00016′.

Plant 2′–3′ high, pileus 1′–2′ broad, stem 2″–3″ thick.

Mossy ground in woods. New Scotland. October.

When moist the pileus has the color of boiled chestnuts, when dry, of fresh ones. The incurved margin of the young pileus is whitened by the veil. The lamellae are darkest when young.

Cortinarius (Heygrocybe) pulcher, *Peck.*

Pileus conical, then broadly convex, umbonate, often irregular, hygrophanous, ochraceous, shining and sometimes striatulate when moist, pale ochraceous when dry; lamellae subdistant, broad, emarginate, uneven on the edge, ochraceous, stem equal, solid, subflexuous, silky-fibrillose, whitish or pale ochraceous; spores .00033′ × .0002′.

Plant gregarious, 2′ high, pileus 1′–1.5′ broad, stem 1′–2′ thick.

Ground in woods. New Scotland. October.

Paxillus strigosus, *Peck.*

Pileus dry, convex or expanded, brittle, strigose with scattered stiff hairs, whitish; lamellae close, narrow, subdecurrent, whitish, then pale cinnamon color, some of them forked; stem equal, solid, pruinose, concolorous; spores brownish-ochre, subglobose, .00018′ in diameter.

Plant 2′ high, pileus 1′–1.5′ broad, stem 1″–1.5″ thick.

Ground among fallen leaves in woods. Caraghan. September.

The young plant might readily be mistaken for a species of Clitocybe. Owing to the very brittle character of the pileus, the lamellae are not easily separated from it. The hairs of the pileus are either erect or appressed.

Lactarius regalis, *Peck.*

Pileus convex, deeply depressed in the center, viscid when moist, often corrugated on the margin, white tinged with yellow; lamellae close, decurrent, whitish, some of them forked at the base; stem stout, short, equal, hollow, smooth; taste acrid; milk sparse, white quickly changing to sulphur-yellow; spores .0003′.

Plant 4′–6′ high, pileus, 4′–6′ broad, stem 1′ thick.

Ground in woods. Croghan. September.

This interesting plant rivals *L. piperatus* in size and closely resembles it in general appearance, but the viscid pileus and sparse milk quickly changing to yellow, as in *L. chrysorrheus*, clearly distinguish it.

Lactarius Geradii, *Peck.*

Pileus expanded or centrally depressed, dry, rugose-wrinkled, often with a minute umbo or papilla, sooty-brown, the thin spreading margin sometimes wavy or irregular; lamellae broad, distant, decurrent, white, the interspaces uneven; stem equal, solid, colored like the pileus; flesh and spores white; taste mild; milk white and unchangeable.

Plant 3′–5′ high, pileus 2′–4′ broad, stem 4″–6″ thick.

Ground in woods and groves. Poughkeepsie, *W. R. Gerard.* Albany and Croghan. September.

In the color of the pileus and stem, this species is like the large variety of *L. fuliginosus*, but its real relationship is with *L. distans*, from which it is separated by its color and its longer equal stem, characters which may prove to be only varietal.

Russula sordida, *Peck.*

Pileus firm, convex, centrally depressed, dry, sordid white, sometimes clouded with brown; lamellae white, some of them forked; stem equal, solid, concolorous; spores globose, .0003′; taste acrid; flesh changing color when wounded, becoming black or bluish-black.

Plant 4′–5′ high, pileus 3′–5′ broad, stem 6″–12″ thick.

Ground under hemlock trees. Worcester. July.

The whole plant turns black in drying.

Marasmius semihirtipes, *Peck.*

Pileus thin, tough, nearly plane or depressed, smooth, sometimes striate on the margin, hygrophanous, reddish-brown when moist, alutaceous when dry, the disk sometimes darker; lamellae subdistant, reaching the stem, slightly

venose-connected, subcrenulate on the edge, white; stem equal, hollow, smooth above, velvety-tomentose toward the base, reddish-brown.

Plant gregarious, 1′–2′ high, pileus 6″–9″ broad, stem .5″ thick.

On and among fallen twigs and leaves. West Point. June.

Marasmius umbonatus, *Peck.*

Pileus thin, tough, expanded, umbonate, smooth, even or substriate, alutaceous, the margin at first incurved; lamallae narrow, subdistant, reaching the stem, venose-connected, sometimes branched toward the outer extremity, white; stem equal, solid, velvety-tomentose, tawny below, paler above.

Plant gregarious, 1′–1.5′ high, pileus 6″–9″ broad, stem .5″ thick.

Ground under balsam trees. North Elba. July.

Marasmius caespitosus, *Peck.*

Pileus fleshy, convex, even, brown, with a lilac tint, the thin margin exceeding the lamallae; lamellae close, free, somewhat united with each other at the stem, narrowed outwardly, white; stem sometimes compressed at the top, stuffed or hollow, pruinose.

Plant caespitose, 1′–2′ high, pileus 6″–10″ broad.

Birch stumps in woods. Richmondville, June.

Marasmius longipes, *Peck.*

Pileus thin, convex, smooth, finely striate on the margin, tawny-red; lamellae white; stem tall, straight, equal, hollow, pruinose-tomentose, radicating, brown or fawn color, white at the top.

Plant 2′–5′ high, pileus 4″–6″ broad, stem .5″ thick.

Among fallen leaves in woods. Savannah and Bethlehem. August and October.

The long straight slender stem is a characteristic feature of this plant.

Marasmius glabellus, *Peck.*

Pileus membranaceous, convex, then expanded, distantly striate, often uneven on the disk, dingy-ochraceous; lamellae broad, distant, unequal free, ventricose, whitish, the upper margin and the interspaces venose; stem corneous, equal, smooth, shining, hollow, reddish-brown or chestnut, whitish at the top, with a thick mycelium at the base.

Plant 1′–2′ high, pileus 6″–10″ broad, stem .5″ thick.

Fallen leaves in woods. Worcester and Croghan. July and September.

Marasmius straminipes, *Peck.*

Pileus membranaceous, hemispherical or convex, smooth, striate, whitish; lamellae distant, unequal, white; stem corneous, smooth, shining, filiform, inserted, pale straw color.

Plant 1′–2′ high, pileus 1″–3″ broad.

Fallen leaves of the pitch pine, *Pinus rigida.* Center. October.

Lenzites vialis, *Peck.*

Pileus coriaceous, sessile, dimidiate or elongated, sometimes confluent, obscurely zoned, subtomentose, brown or grayish-brown, the margin cinereous; lamellae thin, anastomosing abundantly, pallid, cinereous-pruinose on the edge when fresh.

Pileus 6″–12″ long.

Old railroad ties. North Greenbush and Center. October.

Boletus separans, *Peck.*

Pileus thick, convex, smooth, shining, sometimes deeply lacunose, brownish-lilac; tubes plane or slightly depressed around the stem, at first quite closed and attached to the stem, then by the expansion of the pileus usually torn from it, small, subrotund, yellow or brownish-yellow; stem solid, nearly equal, distinctly reticulated, dull lilac; spores .00055′ × .00022′; flesh white, unchangeable.

Plant 3′–4′ high, pileus 3′ broad, stem 6″–10″ thick.

Grassy ground in open woods. Greenbush. August.

In dry weather the separation of the tubes from the stem does not always take place.

Boletus affinis, *Peck.*

Pileus dry, minutely tomentulose, even or slightly rugose, chestnut colored, soon fading to tawny or ochraceous, the cuticle sometimes cracking into areas; tubes plane or convex, attached to the stem and sometimes depressed around it, at first white and closed, then yellow, small, unequal, angular or subrotund; stem solid, unequal, smooth, rarely reticulated at the top, pallid or tinged with dull red; spores .00035′ × .00016′; flesh white, unchangeable.

Plant 2′–3′ high, pileus 2′–3′ broad, stem 6″–10″ thick.

Grassy ground in open woods. Greenbush. July.

Boletus modestus, *Peck.*

Pileus firm, often irregular, dry, yellowish-brown; tubes nearly plane, attached and subdecurrent, pale ochraceous, angular and compound; stem

equal, brown, reticulated with darker lines; spores .0004′ × .0002′; flesh gray or pinkish gray.

Plant 2′ high, pileus 2′ broad, stem 2″–4″ thick.

Grassy ground in open woods. Greenbush. August.

Boletus pallidus, *Frost.*

Pileus soft, viscid when moist, smooth, pale alutaceous; tubes plane, attached to or sometimes slightly depressed around the stem, small, subangular, pale yellow, slightly changing color when wounded; stem subequal, smooth, solid, pallid; spores .00045′ × .00022′.

Plant 2′–5′ high, pileus 2′–4′ broad, stem 4″–6″ thick.

Ground in woods. North Greenbush. August.

Boletus ampliporus, *Peck.*

Pileus broadly convex or expanded, sometimes slightly umbonate, dry, squamulose-tomentose, pinkish-brown; tubes convex, attached or slightly decurrent, very large, angular, compound, yellow; stem equal, solid, yellowish-brown, paler at the top, and marked by the decurrent walls of the tubes; flesh whitish tinged with yellow, unchangeable; spores pale ochraceous, with a greenish tinge, 00035′ × .00016′.

Plant 3′–5′ high, pileus 3′–4′ broad, stem, 3″–6″ thick.

Low mossy ground in woods. North Elba and Sandlake. August and September.

Polyporus caeruleoporus, *Peck.*

Pileus fleshy, broadly convex, subtomentose, moist or hygrophanous, brown; pores short, angular, decurrent, grayish-blue; stem central or eccentric, solid, colored like the pileus, sometimes tinged with the color of the pores; flesh white.

Plant gregarious or subcaespitose, 2′ high, pileus 1′–2′ broad, stem 2″–3″ thick.

Shaded banks. Copake. October.

This and the three following species belong to the section *Mesopus.*

Polyporus griseus, *Peck.*

Pileus fleshy, firm, convex, often irregular, smooth or with a minute appressed silkiness, dry, gray; pores small, short, unequal, subangular, pallid, the mouths white; stem central, thick, short, concolorous; flesh pinkish-gray.

Plant 2′–3′ high, pileus 3′–5′ broad, stem 6″–10″ thick.

Shaded banks. Copake. October.

Polyporus flavidus, *Peck.*

Pileus fleshy, tough, depressed or funnel-form, smooth, rarely a little villous on the disk, zonate, yellow with darker bands, the margin sometimes lobed or wavy; pores short, minute, angular, yellow; stem central, solid, slightly tapering downwards, smooth, subconcolorous.

Plant 3′–5′ high, pileus 2′–4′ broad, stem 3″–4″ thick.

Ground in woods. Worcester. July.

Polyporus splendens, *Peck.*

Pileus thin, coriaceous, expanded, subumbilicate, slightly zonate, silky, shining, dark ferruginous when moist, tawny ferruginous when dry, the margin deeply fimbriate; pores small, angular, short, subconcolorous; stem slender, equal, tomentose, concolorous.

Plant 1′ high, pileus 6″–10″ broad, stem .5″–1″ thick.

Much decayed stumps. Center. August.

Polyporus attenuatus, *Peck.*

Resupinate, effused, very thin, separable from the matrix, pinkish-ochre, the margin whitish; pores minute, subrotund, with thin acute dissepiments.

Prostrate trunks of deciduous trees. Croghan. September.

The pores are scarcely visible to the naked eye.

Craterellus caespitosus, *Peck.*

Pileus fleshy, tough, irregular, expanded, centrally depressed or funnel-form, smooth, moist, variable in color, greenish-yellow, pinkish-brown, or blackish; the margin sometimes decurved and lobed; hymenium at first smooth, then rugose-wrinkled, the folds decurrent on the short, solid, tough stem which is either central or eccentric; spores oblong, obtuse, sometimes slightly curved, .00035′–.00045′ long.

Plant caespitose, 6″–12″ high, pileus 6″–10″ broad.

Decaying wood in swamps. Portville. September.

The pilei sometimes grow together, forming an intricate irregular tuft.

Grandinia coriaria, *Peck.*

Effused, membranaceous-tomentose, separable from the matrix, under side and margin tawny-yellow, upper side and minute crowded granules greenish or dingy olivaceous; spores globose, rough, .0003′ in diameter.

Forming patches 1′–3′ in diameter on old scraps of leather in damp places. Greenbush. August.

Thelephora Willeyi, *Clinton.*

Pileus funnel-formed, thin, smooth, obscurely zoned, white, the margin entire or laciniately toothed and lobed; hymenium smooth, concolorous; stem central, equal, solid, white.

Plant 1′–1.5′ high, pileus 6″–12″ broad, stem .5″–1″ thick.

Ground in woods. Buffalo, *G. W. Clinton.* Lowville. September. Sometimes the pileus is split on one side down to the stem.

Stereum radiatum, *Peck.*

Resupinate or slightly reflexed, suborbicular, blackish-brown; hymenium uneven, marked with thick corrugations or ridges radiating from the center, cinnamon color.

Old hemlock logs. Catskill Mountains. June.

Corticium bicolor, *Peck.*

Thin, membranaceous, resupinate, flaccid, smooth, separable from the matrix, under surface greenish-yellow, upper surface white.

Rotten wood. Center. October.

Clavaria pusilla, *Peck.*

Stem slender, solid, rather tough, much and irregularly branched; branches unequal, divergent, tips acute.

Plant scarcely 1′ high, yellowish.

Ground under spruce and balsam trees. North Elba. September.

Clavaria clavata, *Peck.*

Simple, straight, clavate, obtuse, smooth, not hollow, yellow when fresh, rugose-wrinkled and orange colored when dry.

Plant 4″–6″ high.

Damp shaded banks by roadsides. Sandlake. June.

The surface of the ground where it grows is covered by a stratum of green confervoid filaments. The species is related to *C. mucida.*

Tremella colorata, *Peck.*

Plant gregarious, swollen subglobose or irregular soft pulpy and raisin-colored when moist, externally black and internally brownish-pink when dry; filaments colored in the mass; spores globose, colored like the hymenium when mature, .0005′–.0007′ in diameter.

Bark of dead ash trees. Tyre. September.

Exobasidium Azaleae, *Peck.*

Gall subglobose, often lobed or irregular, succulent, fleshy, solid, smooth pale green or glaucous becoming pruinose; spores oblong, straight or curved, obscurely uniseptate, white, .0006′–.0008′ long.

Terminal on living twigs of the pinxter plant, *Azalea nudiflora,* transforming the flower buds.

North Greenbush and New Scotland. May and June.

Exobasidium Andromedae, *Peck.*

Gall flattened or somewhat cup shaped, more or less lobed, smooth, pale green or green varied with red, becoming paler and pruinose with age, hollow, the cavity containing shreds of loose soft cottony filaments; spores narrow, oblong, simple, often curved near one end, white, .0007′–.0009′ long.

Lateral on living branches of *Andromeda ligustrina,* transforming the leaf buds.

Center. May and June.

GASTEROMYCETES.

Lycoperdon pedicellatum, *Peck.*

Subpyriform, whitish, the outer peridium persistent, forming dense angular spinose processes which are smaller toward the base of the plant; capillitium and spores greenish ochre or dingy olivaceous; spores smooth, pedicellate, globose, .00016′–.00018′ in diameter, the pedicel three to five times as long.

Ground and rotten wood. Croghan and Center. September and October.

The spores resemble those of species of Bovista.

Diderma crustaceum, *Peck.*

Effused or circumambient, crowded, sessile, subglobose, smooth, white, outer peridium crustaceous, resembling the shell of some small egg, the inner delicate, appearing cinereous to the naked eye, iridescent under the microscope; columella none; spores globose, black, .0005′ in diameter.

Diderma farinaceum, *Peck.*

Effused or circumambient, crowded, sessile, subglobose, plumbeous when moist or young, white rugulose and farinaceous when dry; spores globose, brown, black in the mass, .0004′ in diameter.

Incrusting mosses and fern stems in low woods. Croghan. September.

Diderma Mariae-Wilsoni, *Clinton.*

Scattered or crowded, sessile, subglobose, smooth, white or pinkish-white, outer peridium crustaceous, within at the base brownish-pink, inner peridium delicate; columella subglobose, rugulose, slightly colored; spores globose, blackish-brown, .0004′ in diameter.

Fallen leaves, sticks, moss, etc. Buffalo, *Clinton.* Memphis, Center and Sandlake. August and October.

Didymium connatum, *Peck.*

Peridium depressed or subglobose, cinereous, furfuraceous, stipitate; stems mostly connate at the base, tapering upward, longitudinally wrinkled, whitish or cream color; spores subglobose, black, .0004′ in diameter.

Decaying fungi. Portville. September.

The subfasciculate mode of growth is a marked feature in this species.

Physarum pulcherripes, *Peck.*

Peridium globose, variable in color, ochraceous, gray, brown or black; stem slender, equal or slightly tapering upwards, vermillion; spores globose, brown, .00033′ in diameter.

Rotten wood. Richmondville and Worcester. July.

The bright color of the stem is quite conspicuous, notwithstanding the small size of the plant.

Physarum caespitosum, *Peck.*

Peridia aggregated in tufts or clusters, crowded, sessile, smooth, brown or blackish-brown; spores dingy ochre, smooth, globose, .00025′ in diameter.

Decaying wood. Greenbush. August.

Craterium obovatum, *Peck.*

Peridium obovate, rugose-wrinkled, glabrous, lilac-brown; flocci whitish; stem colored like the peridium; spores smooth, globose, black, .0005′–.0006′ in diameter.

Decaying wood and fallen leaves. Center, Sandlake and Croghan. August and September.

The operculum is not always distinct, the peridium appearing frequently to be irregularly ruptured at the apex.

Stemonitis herbatica, *Peck.*

Densely fasciculate; capillitium slender, cylindrical, brown when moist, ferruginous-brown when dry; stem black, arising from a membranaceous

hypothallus, penetrating to the apex of the capillitium; spores globose, .0003′–.00035′ in diameter.

Plant 2″–3″ high, growing on living leaves of grass and herbs. Albany. June.

The color of this plant is almost the same as that of *S. ferruginea*, but the spores are much larger, surpassing even those of *S. fusca*.

Trichia reniformis, *Peck.*

Peridia gregarious or clustered, sessile, subglobose or reniform, small, brown; flocci few, short, sparingly branched; spores globose, minutely echinulate, yellow-ochre, sometimes tinged with green, .0005′ in diameter.

Dead bark of striped maple, *Acer Pennsylvanicum*. Portville. September.

The branches and apices of the flocci are sometimes without spiral markings and slightly nodulose.

Perichaena flavida, *Peck.*

Yellow throughout; peridia crowded, clustered, sessile, variable in size and shape, shining; flocci few, short, subnodulose, obtuse, sparingly branched; spores globose, enchinulate, .00045′ in diameter.

Mosses. Sandlake. August.

The bright golden yellow color renders the clusters conspicuous.

CONIOMYCETES.

Dinemasporium Robiniae, *Gerard.*

Perithecia cup-shaped, bristly, black; spores hyaline, .0002′ long, the terminal bristles about as long as the spore.

Dead wood of locust trees. Poughkeepsie, *Gerard.*

Dinemasporium acerinum, *Peck.*

Perithecia small, pezizoid, black, hispid with short straight scattered black hairs; spores unequally elliptical, .0003′ long, the terminal bristles scarcely one-third the length of the spore.

Dry maple wood. Buffalo, *Clinton*. April.

Puccinia pulchella, *Peck.*

Spots yellow or greenish-yellow, orbicular, rarely confluent; sori small, circinating, sometimes confluent, blackish-brown; spores .001′–0013′ long, .0006′ broad.

Upper surface of leaves of *Ribes prostratum.* North Elba. July.

Puccinia Cryptotaeniae, *Peck.*

Spots small, pallid or yellowish, sometimes tinged with purple, dotted by the sori, occasionally confluent; sori minute, clustered, at first covered by the epidermis, then surrounded by its pale ruptured remains which continue in the form of a small pustule with a contracted subcircular opening at the apex, reddish-brown; spores subelliptical, scarcely constricted, crowned with a hyaline pustule, .0011′–.0016′ long, .0006′ broad.

Under surface of leaves of *Cryptotaenia Canadensis.* North Greenbush. June.

Puccinia Mariae-Wilsoni, *Clinton.*

Amphigenous; spots none; sori scattered or clustered, unequal, reddish-brown; spores subelliptical, scarcely constricted, crowned with a pustule, .0013′–.0018′ long, .0007′–0008′ broad.

Leaves and stems of *Claytonia Caroliniana.* Buffalo, *Clinton.* Knowersville. May.

Puccinia Lobeliae, *Gerard.*

Sori minute, scattered or confluent, tawny-brown; spores oblong-elliptical, slightly constricted at the septum and easily separating into two parts, pale, .0013′–0016′ long; pedicel short or obsolete.

Under surface of leaves of *Lobelia syphilitica.* Poughkeepsie, *Gerard.* The fragile spores are peculiar.

Puccinia obtecta, *Peck.*

Cauline; sori unequal, often very large, angular or orbicular, scattered or confluent, slightly elevated, long covered by the epidermis, black; spores oblong or oblong-clavate, sometimes curved, constricted, obtuse or obtusely pointed, .0018′–.0024′ long, .0008′ broad; pedicel colored, seldom half as long as the spore.

Stems of *Scirpus validus* and *S. pungens.* Watkins, Montezuma Marshes and Albany. September and October.

Puccinia linearis, *Peck.*

Amphigenous; sori very narrow, deep seated, oblong or linear, parallel, crowded, long covered by the epidermis, black; spores oblong, slightly tapering toward the base, not constricted, very obtuse or truncate, .0018′–0024′ long, .0006′ broad; pedicel colored, very short.

Leaves and sheaths of grasses. Watkins. September.

This is related to *Puccinia cornata,* but it is without the apical teeth of the spore.

Puccinia angustata, *Peck.*

Hypogenous; spots pallid or none; sori oblong or linear, sometimes regularly arranged at equal intervals in long parallel lines, narrow, black; spores narrow, oblong-clavate or elongated, septate above the middle, strongly constricted, having the lower cell more narrow than the upper, and cylindrical or slightly tapering downwards, .00018′–.0024′ long, .0006′ broad; pedicel colored, thick, very short.

Leaves of *Scirpus sylvaticum* and *S. Eriophorum.* West Albany and Watkins. September.

Protomyces Erythronii, *Peck.*

Spots stained with red or purple; spores growing in the tissues of the leaf, scattered or crowded, most often arranged in short series and erumpent through narrow chinks in the epidermis, large, globose, at length black, .002′–.0026′ in diameter.

Leaves and petioles of *Erythronium Americanum.* Greenbush. May.

The leaf is most frequently affected at the base of the lamina or blade.

Ustilago Erythronii, *Clinton.*

Produced on the leaves in oblong or irregular vesicular patches, half an inch or more in length; spores globose, rough, rather large, .0006′–.00075′ in diameter, black in the mass.

Leaves of *Erythronium Americanum.* Goat Island, *Clinton.*

Uredo Ledicola, *Peck.*

Spots small, definite, rarely confluent, suborbicular, reddish-brown, sometimes with a darker border; sori subrotund or irregular, surrounded by the ruptured epidermis; spores subglobose, rough, .0012′ in diameter, orange, with a thick hyaline epispore.

Upper surface of leaves of *Ledum latifolium.* Mt. Marcy. July.

Apparently quite distinct from *U. Ledi* A. & S.

Peridermium Cerebrum, *Peck.*

Peridia large, convex, erumpent, irregularly confluent, forming brain-like convolutions, white, rupturing irregularly, the cells radiate-striate on the margin; spores ovate-elliptical or subglobose, rough, yellow, .0008′–.0011′ long.

Trunks and branches of young pine trees, *Pinus rigida*, forming excrescences half an inch to two inches in diameter. Center, *J. A. Lintner.*

Roestelia aurantiaca, *Peck.*

Peridia cylindrical, fragile, soon lacerated, fugacious, white; spores subglobose, bright orange, about .001′ in diameter, with a thick hyaline epispore.

Unripe fruit of *Amelanchier Canadensis.* New Baltimore, *J. L. Zabriskie.* Keene. July. Also on the unripe fruit of *Crataegus.* Buffalo, *Clinton.*

The color of the spores will enable this species to be easily recognized.

Aecidium Gerardiae, *Peck.*

Spots small, suborbicular, scattered, yellowish-green, peridia usually few, small, short, the mouth fringed with spreading or recurved teeth; spores orange, .0008′ in diameter.

Leaves of *Gerardia quercifolia.* Highlands near Cold Spring. June.

Aecidium album, *Clinton.*

Spots none; peridia scattered, short, white, the margin subentire; spores subglobose, white, about .0008′ in diameter.

Under surface of leaves of *Vicia Americana.* Buffalo, *Clinton.*

Aecidium Lycopi, *Gerard.*

Spots yellow; subiculum more or less thickened; peridia short, scattered or crowded, margin crenate; spores pale yellow.

Leaves, stems and petioles of *Lycopus Europaeus.* Poughkeepsie, *Gerard.* Buffalo, *Clinton.* June.

Aecidium Hydrophylli, *Peck.*

Spots small, few, yellow, with a pale greenish border; subiculum thickened whitish; peridia few, generally crowded, short, the margin subcrenate; spores bright yellow or orange; spermogonia central, on the opposite side.

Under surface of leaves of *Hydrophyllum Canadense.* Catskill Mountains. June.

HYPHOMYCETES.

Stilbum ramosum, *Peck.*

Head subglobose, whitish or pale yellow; stem thick, smooth, branched, white above, pallid or brownish below, sometimes creeping and sending up branches at intervals; spores minute, oblong.

Dead larvae of insects buried in rotten wood. Sterling. September.

Periconia Azaleae, *Peck.*

Plant small, .03′–04′ high, black; stem slightly tapering upward; head globose; spores subglobose or elliptical, colored, .0002′–.0003′ long.

Twigs, capsules and old galls of *Azalea nudiflora.* New Scotland. June.

Macrosporium Chartarum, *Peck.*

Flocci long, jointed, flexuous, branched, colored; branches widely spreading, somewhat nodulose; spores variable, subglobose, elliptical, obovate or pyriform, black, shining, one to three septate, with one or two longitudinal septa, .0006′–001′ long.

Damp paste board. Albany. November. It forms indefinite black spots or patches.

Clasterisporium pedunculatum, *Peck.*

Flocci erect, opaque, septate; spores terminal, nearly straight, multiseptate, colored, mostly subfusiform or lanceolate, about .003′ long, the terminal cell hyaline.

Cut surface of wood. Savannah. October.

Streptothrix abietina, *Peck.*

Tufts pulvinate, scattered or crowded, blackish-brown; flocci branched, pale, echinulate; spores globose, minutely rough, .00025′–.0003′ in diameter.

Bark of prostrate trunks of spruce trees. Sandlake. September.

The larger rough spores and echinulate threads separate this species from *S. atra.*

Aspergillus fuliginosus, *Peck.*

Creeping flocci white, septate; fertile flocci erect, not septate, crowned with a globose head which is rough with projecting processes; spores globose, sooty-black, smooth, .00016′ in diameter.

Rice paste and apple. Albany.

ASCOMYCETES.

Microsphaera Russellii, *Clinton.*

Amphigenous; mycelium arachnoid, evanescent; appendages 8–18, very long, flexuous, colored, paler toward the tips which are simple or one to three times divided; sporangia ovate, 4–8; spores 4, elliptical, .0007′–.0008′ long.

Leaves and petioles of *Oxalis stricta.* Buffalo, *Clinton.* Poughkeepsie, *Gerard.* North Greenbush. October.

This might with almost equal propriety be referred to the genus Erysiphe.

Erysiphe Euphorbiae, *Peck.*

Mycelium thin; conceptacles small, .0035′ in diameter; appendages few, long, flexuous, colored; sporangia broadly ovate, 3–4; spores 3–4, large, .001′ × .00065′.

Leaves of *Euphorbia hypericifolia.* Greenbush. October.

Geoglossum simile, *Peck.*

Plant 1′–2′ high, black, minutely hairy; club obtuse, generally compressed, sometimes with a broad shallow groove on one side, tapering into the stem; asci broad; spores fasciculate, elongate, slightly curved, seven-septate, colored, .003′–.0004′ long; paraphyses slightly thickened at the tips, septate, sometimes branched.

Damp mossy ground in swamps and in peat bogs. Ft. Edward, *Howe.* Sandlake. September.

It is scarcely possible to separate this species from *G. hirsutum* without microscopical examination.

Vibrissea lutea, *Peck.*

Plant 6″–12″ high, yellow, receptacle subglobose, smooth, the margin slightly lobed, inflexed, free; stem nearly equal, solid, a little more highly colored than the receptacle, longitudinally wrinkled when dry; asci clavate or cylindrical; spores long, filiform.

Prostrate mossy trunks of trees and among fallen leaves in woods. North Elba. August.

Peziza Solenia, *Peck.*

Cups minute, nearly cylindrical, hairy, brown, opening by a contracted, white-margined mouth; spores oblong, crowded or biseriate, uniseptate usually with four nuclei, subhyaline, .0005′ long; paraphyses filiform.

Dead stems of *Eupatorium ageratoides* in damp shaded places. Watkins Glen. September.

The cups are a little longer than broad, and appear like some minute solenia.

Rhytisma linearis, *Peck.*

Linear, here and there interrupted or constricted, black; asci broad, clavate, eight-spored; spores very long, obtuse, strongly narrowed in the middle, involved in mucus, .002′–.003′ long.

Under surface of leaves of pine trees, *Pinus Strobus.* Guilderland, Greenbush and Sandlake. June.

It forms a thick black line on the under surface of the leaf, often extending the entire length. The spores appear to consist of two oblong parts connected by a narrow neck.

Hypomyces polyporinus, *Peck.*

Perithecia minute, ovate or subconical, seated on a pallid subiculum, smooth, yellowish, or pale amber; asci narrow, linear; spores fusiform, acuminate at each end, nucleate, .0006′–.0007′ long.

On *Polyporus versicolor.* Worcester and Croghan. July and September.

Nectria Apocyni, *Peck.*

Conidia. Subhemispherical or irregular, small, pale red; spores fusiform, straight, .0005′–.0006′ long.

Ascophore. Caespitose or scattered, dull red, perithecia minute, pale ochraceous, and subglobose when moist, dull red collapsed or laterally compressed and rough with minute whitish scales when dry; spores biseriate, uniseptate, fusiform, nucleate, .00065′–.0008′ long.

Base of dead stems of *Apocynum cannabinum.* North Greenbush. October.

Nectria mycetophila, *Peck.*

Perithecia crowded or scattered, minute, smooth, subglobose, pale yellow when young, then pinkish-ochre; ostiole minute, papillate, distinct, darker colored; asci subclavate; spores oblong, simple, .0005′ × .00016′.

Decaying fungi. New Scotland. October.

Sphaeria Staphylina, *Peck.*

Perithecia minute, black, covered by the epidermis, which at length ruptures in a stellate manner or irregularly; spores biseriate, colorless, constricted in the middle, three to five septate, .0009′–.001′ long, the two parts formed by the central septum unequal in diameter.

Dead twigs of *Staphylea trifolia.* Helderberg Mountains. May.

Sphaeria Desmodii, *Peck.*

Perithecia scattered or seriately placed, minute, covered by the epidermis, which is pierced by the acute ostiole, black; asci clavate; spores biseriate, fusiform, colorless, four nucleate, .00035′–.0004′ long.

Dead stems of Desmodium. Garrisons. June.

VI. Contributions to a Knowledge of North American Moths

BY AUG. R. GROTE.

[*Read before this Society, June 6th*, 1873.]

Dumeril, in 1823, and afterwards Boisduval, in 1836, availed themselves of the structural feature offered by the different antennal forms in the Lepidoptera to establish ideal divisions, higher than Families, in the sub-order. Although not so strongly insisted upon, other considerations may have suggested themselves, apparently justifying a separation of the Butterflies from the rest of the Lepidoptera. But, as we become acquainted with the sub-order, the peculiarities of the Butterflies lessen by comparison. And since the form of the antennae is nowhere absolute, and even in reality will not always separate the Butterflies from many Moths, and since the divisions proposed by Dr. Boisduval are evidently of unequal value, and the character on which they rest of little systematic weight, the terms cannot be retained. Boisduval's terms are in part synchronous with Duméril's, which, in case of acceptance of the values intended, should be preferred. The comparatively persistent character of the clavate antennae in the Butterflies is noticed by Hübner in 1816. But it is evident that the Hesperidae, for instance, present a modification of the form of the antennus as we find it in the higher Butterflies, and are accordingly not to be indifferently classed with them. It would seem as though the succession of Family groups in the Lepidoptera is not to be disturbed by higher exact division, nor need we employ other terms than our common ones for general purposes of designation.

Professor Agassiz, in 1849, records a character which had been before unnoticed by the classificators of the sub-order. Agassiz calls attention to the fact, that there is a common position of the

wing in all the Lepidoptera in the pupa state. The wings are then bent downwards, and the upper wings cover the lower ones, the upper surface of the latter turned sidewise. In the Papilionidae, or true Butterflies, in their adult state, the wings are raised above the body, their upper surface turned upwards and inwards, never turning outwards. In the mature Hesperian the position of the wings is different; the anterior pair only are raised, while the lower ones are stretched horizontally. In the perfect state of the lowest Moths, the wings are stretched backwards close to the body, which they more or less surround. In the varying attitude of the wings we evidently have a manifestation of the cephalic principle, and accordingly a safe basis upon which to found our systematic arrangements.

It is with diffidence that I suggest that, in the position of the wings, we have a character which might be interpreted as assigning a higher position to the Geometridae. In most of these moths there is a more frequent common ornamentation of the upper surface of the wings, perhaps predicated by the exposure of the hind pair in a state of rest to the light.

With regard to the position of the Deltoids, Lederer says:

"Ich konnte, wie gesagt, ebenfalls keine [Verschiedenheit] auffinden und trage um so weniger Bedenken, die nun aufzuführenden Arten [Deltoiden] zu den Eulen zu rechnen, als sie selbst dann, wenn noch ein sie von diesen trennendes, ausschliessliches Merkmal aufgefunden werden sollte dennoch hier und nicht bei den *Pyraliden* unterzubringen wären und der Totaleindruck sie gewiss von diesen noch weit mehr, als von den *Noctuinen* unterscheidet, überhaupt weniger in Wirklichkeit als in der Gewohnheit diese Arten als *Pyraliden* zu betrachten, besteht."

While I am not agreed with the separation of the Cymatophorina, *Herrich-Schaeffer*, as a group equivalent to the Noctuidae, nor as having more than analogies with the Bombycidae, I think we shall be justified in considering the Deltoids as belonging to the Noctuidae; and this rather than allow an interpolation of the Family Geometridae between groups so nearly allied, that certain of our first authorities, Zeller, Lederer and Herrich-Schaeffer, cannot separate them by any tangible character.

An idea that the affinities in the Lepidoptera are net-like and not, as they seem to me, branch-like, has excused the classification, especially of the Bombycidae, adopted by v. Heineman and Staudinger, by which Subfamily groups are accorded Family rank, and so incongruous a sequence is adopted, that this would seem the end sought, rather than a natural arrangement of the Moths. No or little allowance is made for comparative characters, and the severity of the generic classification has permitted no adequate comprehension of these softer zoölogical forms. We miss any reference to American genera (without which perhaps no true limitation can be decided upon), either as illustrated by American writers or by the pens of European authors who have investigated so largely the Lepidopterous Faunae of other continents. v. Heineman establishes the European genus Scodra, without reference to Guenée's Leptina, from America, which it seems should have been compared.[1] On the other hand Packard, in 1864, has indicated in several cases the comparative generic position of European Bombycidae, and, in 1865, we have drawn attention to relationships between the Sphingidae of either continent, and in particular to the position which the European Macrosila convolvuli and Sphinx ligustri occupy with regard to the American species of the two genera.

I give here a catalogue of our North American species referable to Herrich-Schaeffer's Family *Cymatophorina*, for which I prefer Boisduval's earlier term, and regard them as forming a sub-family of the Noctuidae. Alone of any of the divisions of the family heretofore proposed, they possess a distinctive structural feature, found in the course of the costal nervure of the secondaries.

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[1] Auf Seite 17, v. Heineman's Schmetterlinge Deutschlands und der Schweiz, steht, Z. 9, v. unten, "bei der Hesperiengattung *Cyclopaedes* die Hinterschienen auch mit Mittelspornen." Schlägt man, Seite 115, d. Gattung auf, so findet sich gerade des Gegentheil angegeben: "Hinterschienen nur mit Endspornen."

Family, NOCTUIDAE.

Subfamily, **NOCTUO-BOMBYCINI,** *Boisduval* (1829).

Tribe, VERAE, *Grote* (1863).

CYMATOPHORA, Treitschke (1824).

Type: Noctua flavicornis, *Linnaeus.*

caniplaga, *Walker.*[2] ——
Canada (Auth. Walker).

LEPTINA, Guenée (1852).

Type: Leptina dormitans, *Guenée.*

dormitans, *Guenée.*
New York; Pennsylvania.

latebricola, *Grote.*
New Jersey.

ophthalmica, *Guenée.*
New York; Pennsylvania; Alabama.

Doubledayi, *Guenée.*
Massachusetts; New York; Pennsylvania.

formosa, *Grote.*
Massachusetts.

Tribe, FALSAE, *Grote* (1863).

PSEUDOTHYATIRA, Grote (1864).

Type: Thyatira cymatophoroides, *Guenée.*

cymatophoroides, *Grote.*

♂ *Thyatira cymatophoroides,* Guenée.

New York; New Jersey; Pennsylvania.

expultrix, *Grote.*

♀ *Thyatira cymatophoroides,* Guenée.

Canada; New York; Pennsylvania.

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[2] Mr. Walker's *Cymatophora viridescens* is erroneously determined generically, and I retain the present species with hesitation on the list.

HABROSYNE, Hübner (1816).

Type: Noctua derasa, *Linnaeus.*

scripta.

Thyatira scripta, Gosse.

Thyatira abrasa, Guenée.

Canada; New York; Pennsylvania; Virginia.

THYATIRA, Ochsenheimer (1816).

Type: Noctua Batis, *Linnaeus.*

pudens, *Guenée.*

New York; Pennsylvania.

The tribes I have adopted in the Moths are founded upon a more intimate resemblance among groups of genera; they may possibly assist us in placing the different forms into a natural position.

Dr. Packard has shown the existence of two Subfamily types in the Noctuidae, corresponding in the main with M. Guenée's Trifidae and Quadrifidae, but based on other and comparative characters. Lederer had previously shown that M. Guenée's definitions are inexact, and had contended that the Noctuidae are not susceptible of any Subfamily division.

The species thrown together under Acronycta appear susceptible of generic division, while our knowledge of the difficult forms is as yet extremely defective. The early stages must be studied, since we find the statements of authors that these differ widely in otherwise closely allied species. I here indicate, I fear imperfectly, the different groups into which it seems our species may be divided, not changing the general generic designation, and leaving many questions for the moment unsolved.

In 1868 we recorded our opinion of Mr. Walker's description of American Moths, based upon our personal examination of the British Museum collections. So many authorities concur in an unfavorable opinion of Mr. Walker's labors, that we need no excuse for omitting here any reference to the British Museum Catalogue, except where we have identified Mr. Walker's descriptions.

Subfamily **NOCTUINAE,** *Packard.*

Tribe, BOMBYCOIDES (*Hübner*).

ACRONYCTA, Ochsenheimer (1816).

§

vinnula, *Grote.*
New York; New Jersey; Pennsylvania.

§ Triaena, *Hübner* (1816).

Type: Noctua psi, *Linnaeus.*

grisea, *Walker.*[3]
Noctua grisea, Barnston MS.
Hudson's Bay Territory.

Tritona, *Guenée.*
Triaena Tritona, Hübner.
Canada; New York; Pennsylvania.

occidentalis, *Grote and Robinson.*
Acronycta psi, ‡ Guenée (in part, B).
Canada; Massachusetts; New York; Pennsylvania.

telum, *Guenée.*
New York.

morula, *Grote and Robinson.*
Canada, New York.

Lobeliae, *Guenée.*
Canada; New York; Pennsylvania.

furcifera, *Guenée.* ——
Amérique Septentrionale (auth. Guenée).

hasta, *Guenée.* ——
Amérique Septentrionale (auth. Guenée).

interrupta, *Guenée.*[4] ——
Georgia (described from Abbot's drawings).

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[3] This species differs from *Tritona* in the whitish secondaries, but otherwise closely resembles Hübner's species. I have examined the types in the British Museum.

[4] From the manner of remark on page 121 of the Second Report on the Insects of Missouri, it would be inferred this species had been identified. I do not think it can be readily known from the existing description.

spinigera, *Guenée.*
New York; Pennsylvania.

connecta, *Grote.*[5]
New York.

§

funeralis, *Grote and Robinson.*
Canada; Ohio.

§

innotata, *Guenée.*
Diphthera Graefii, Grote.
New York; Pennsylvania.

§ Acronycta, *Hübner,* restr. (1816).

Type: Noctua leporina, *Linnaeus.*

Lupini,[6] *Behr.*
California.

lepusculina, *Guenée.*
Acronycta populi, 2d Missouri Report.
Pennsylvania; Missouri.

insita, *Walker.*
New York. *Spec. distinct.?*

§ Megacronycta,[7] *Grote* (1873).

Type: Acronycta hastulifera, *Guenée.*

hastulifera, *Guenée.*
Phalaena hastulifera, Abbot and Smith.
Apatela americana, Harris.
Canada; Pennsylvania; Massachusetts; Southern States.

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[5] *Acronycta connecta, n. s.*, ♂, is the narrowest winged species known to me. The body is rather long and stout. Hoary gray, with a testaceous tinge, the markings indistinct. The wing is darker clouded centrally and above internal margin between the basal and internal black dashes. The costal marks are very faint. The orbicular is a void, rather small annulet, and its more whitish hue contrasts. The reniform is also rather small, distinctly ringed inwardly where it is stained, incompletely margined outwardly where it is whitish. The t. p. line is well removed to the external margin superiorly. A dark shade, not a streak, opposite the cell. Terminal elongate interspaceal black streaks. Hind wings whitish with darker clouded borders. Beneath dusted, with faint dot and line.
Expanse, 1.25 inch. Sharon Springs, from O. Meske.

[6] I have a single specimen of this species that I refer to this section. Compact, stout-bodied, and thickly scaled; primaries narrow without saggitate marks, median shade distinct, t. p. line continuous with succeeding gray shade, fringes minutely black dotted; secondaries with immaculate fringes. The specimen is obscurely colored, perhaps stained; size of *leporina.*

[7] Gr.: μέγας et Acronycta. In this section vein 5, is hardly weaker, and the cell is in part closed by a veinlet as strong as vein 5. The fore tibiae are somewhat thickened. I do not think the species belongs to Stephens' genus Apatela, of which we appear to have a wrong idea

§ Apatela, *Ochsenheimer* (1816).

Type: Noctua aceris, *Linnaeus.*

acericola, *Guenée.* ——

Phalaena aceris ‡ Abbott and Smith, *non alior.*

"Georgia." *An. spec. sequent.?*

rubricoma, *Guenée.*

New York; Pennsylvania.

luteicoma, *Grote and Robinson*

New York; Pennsylvania.

§

brumosa, *Guenée.* ——

Amérique Septentrionale (auth. Guenée).

Verrilli, *Grote and Robinson.*

Massachusetts; New York.

noctivaga, *Grote.*

New York; Pennsylvania.

superans, *Guenée.*

Canada; New York.

afflicta, *Grote.*

Texas; Pennsylvania.

longa, *Guenée.* ——

Amérique du Nord (auth. Guenée).

§

clareseens, *Guenée.*

New York.

§ Lepitoreuma,[8] *Grote.*

Type: Acronycta ovata, *Grote.*

ovata,[9] *Grote.*

Pennsylvania.

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from Harris' determination. Harris seems to have confused the two illustrations of Abbot, and while he describes our largest species, which is most probably *hastulifera* of the Insects of Georgia, he states it to be figured by Abbot and Smith as *aceris*, which it certainly is not. Harris may have been led to this by larval observations, which perhaps cannot always be considered as correctly made by Abbot. In two instances—Phalaena angulosa, Plate 83, and Phalaena amasia, Plate 90—I have shown that Abbot has represented two distinct species on one plate as from the same larva.

[8] Gr.: λέπις et τόρευμα. This section is characterized by the ovate primaries, which broaden outwardly; the costal edge is produced at the shoulder, depressed centrally and is again full toward the apices. The scales are strongly raised in ridges along the transverse lines.

[9] *Acronycta ovata, n. s.*, Plate 2, fig. 14 ♂, is of the general shape of Hamamelis, but very different in color and with distinct sagittate marks. Gray with a bright tinge, shaded with

Hamamelis, *Guenée.*
New York; Pennsylvania.

dissecta, *Grote and Robinson.*
Massachusetts; New York.

§

sperata,[10] *Grote.*
New York; Pennsylvania.

§

xylinoides,[11] *Guenée.*
New York; Pennsylvania; Missouri.

§ Eulonche,[12] *Grote* (1873).

Type: Acronycta oblinita, *Guenée.*

oblinita, *Guenée.*

Phalaena oblinita, Abbot and Smith.

Canada; New York; Pennsylvania; Southern States.

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testaceous. A black basal dash extends to the twice strongly angulated t. a. line, which is geminate, the inner more distinct line composed of raised scales. Above the basal dash the humeral space is pale beyond the geminate basal half-line. Median space wide superiorly, owing to the superior wide projection of the distinct and regularly denticulated t. p. line. Orbicular rather large, pale and vague, with clouded center. Costal black marks evident. Median shade apparent by raised darker scales. Reniform vague, bisannulate, stained with deep testaceous. A very narrow black distinct dash at internal angle, broken at the pale continued s. t. line. A third black dash, indicated within s. t. line, opposite the disc. Secondaries fuscous, with the distinct black discal spot and dentate line of the paler under-surface reflected.
Expanse, 1.45 inch. Coll. Am. Ent. Soc.

[10] *Acronycta sperata, n. s.*, Plate 2, fig. 1 ♂, belongs apparently to the section of A. myricae, *Guenée.* Clear blue-gray, the usual markings of the primaries distinct and erect. T. a. line geminate, waved, component lines divaricate. Orbicular small, very distinct, a blackish void annulet. Reniform well sized, also distinctly but less completely black ringed, crossed by the median shade. T. p. line regularly dentate, nearly straight, as usual inflected below median nervure. No sagittate marks; s. t. line pale, vague; a series of minute terminal black marks. Hind wings white, dusted costally; beneath white, a little dusted, no lines or spots perceivable.
Expanse, 1.35 inch. Coll. B. S. N. S. and Am. Ent. Soc.

[11] This species resembles *oblinita* in general appearance, but is easily distinguished by the shape of the primaries, the apices being less produced, the external margin a little straighter. The t. p. line is more distinct and removed further towards the external margin, and there is a more or less obvious streak at internal angle. Perhaps the two are confounded in the Third Annual Missouri Report, p. 71. In this same Report, the re-description of Laphygma frugiperda, *Guenée*, the corn-bud-worm moth of Abbot and Smith, as *Prodenia autumnalis*, will at least prevent, it is hoped, "*in this country*," the appearance of scientific descriptions of this variable species "based upon the simple examination of solitary specimens of the perfect insect, *without the fact being mentioned.*" The italics are mine, and the quotations from page 56 of the Third Report. The species alluded to in this Report as "Prodenia commeinae," can certainly not be Abbot and Smith's *Commelinae*, as this is so large as not to be possibly confounded with Laphygma frugiperda.

[12] Gr.: "Ευ et Δόγχη. This section is characterized by the long pointed primaries and sunken head. Vein 5 of the hind wings is a mere fold, and the cell open.

insolita,[13] *Grote.*
Pennsylvania.

Agrotis pitychrous, *Grote,* Plate 2, fig. 11, ♂.

Allied to Agrotis quadridentata and Agrotis cicatricosa *G. & R.*, from Colorado Territory and to the Russian A. acuminifera *Eversmann*, as figured by Herrich-Schaeffer.

Pale grayish white from the base along costal region to the transverse posterior line which is indicated by dark dots. The costal edge is marked, showing the inception of the transverse lines which are not perceptible. The orbicular and reniform are rather large, grayish white, with more or less complete black annuli, lying on the dusky discal field that, in the male, shows a testaceous tint. The claviform mark is black and perceivable in its usual place without the transverse anterior line, the latter fragmentary. The extra basal line is geminate, even, and only discontinued at the whitish costal shade. Median vein whitish and the whitish scales extend along veins three and four to the subterminal line which is exerted at this place. Subterminal space whitish, showing black, more or less evident, cuneiform marks before the line. Terminal space dusky, constricted medially owing to the exserted portion of the subterminal line. Interspaceal blackish cuneiform marks take the place of the terminal line. Fringes stained with testaceous. The hind wings are whitish with diffuse dusky borders in the male, while in the opposite sex they are nearly wholly blackish, contrasting with the white fringes and offering a distinctional character when compared with allied species; a faint discal liture in both sexes. Beneath whitish, with dusky shadings; no transverse lines in either sex; a series of interrupted interspaceal terminal dusky marks. Corporal pubescence whitish; collar with distinct dark lines which define also the tegulae. Abdomen whitish, stained with testaceous at the extremity; ovipositor exserted in the female in which the antennae are simple, while these are finely pectinate in the male.

Expanse, 30 m. m. *Habitat,* Long Island, N. Y. (coll. J. A. Lintner).

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[13] *Acronycta insolita, n. s.*, ♂, resembles A. oblinita, in the lanceolate primary wings, which are even longer and more produced apically. Blackish; orbits of the eyes white. Primaries uniformly blackish, the dark tone obscuring all ornamentation except the t. p. and s. t. lines, which are oblique and appear as rather broad interspaceal lunulated or squared gray marks, which, in the as usual flexed t. p. line, are marked by black outward points, the fragments of the t. p. line itself, the gray marks being the preceding shade. Hind wings white beneath, with the costal region dusted with blackish scales. Palpi with the second joint outwardly black; fore tibiae with blackish longer hair. Abdomen whitish above, darker beneath, rather long. The unusually dark color and pointed wings, together with the peculiar appearance of the transverse lines, should make this species very recognizable. This last section of the genus reminds us of Leucania. My specimen of A. insolita, expands 1.60 inch. Coll. Am. Ent. Soc.

Cloantha ramosula, *Guenée,* Plate 2, fig. 16, primary wing.

Guenée's figure of this species is not recognisable. In the description this species is compared with the type of the genus, the European *C. perspicillaris.* I believe I describe and illustrate here Guenée's *ramosula,* although the description in the Spécies Général is not full and appears to me contradictory in slight points. Cinereous, shaded with ochrey brown. Costal edge cinereous. Below the s. c. nervure the wing is whitish ashen from the base over the cell and, beyond the reniform, this paler shade extends, outwardly obliquely margined, to apex. Orbicular extremely indistinct, indicated by a fragmentary obliquely placed black ringlet. Reniform prominent, large, indistinctly closed outwardly, with an interior brown shade and with its annulus very distinct and black inwardly and inferiorly where it descends below vein 3 and is here surrounded by the diffuse brown shade which extends largely over the median nervules. This black marginal line of the reniform does not enclose the spot but, followed by an inner pale shade, runs upwardly to vein 5, beyond the cell, and is continued straightly outwardly, giving the spot an uncinate appearance or that of a mark of interrogation. T. p. line nearly lost, indicated by little points, visible against the cinereous costal shading. A black streak below m. nervure at the base of the wing. A series of black interspaceal subterminal dashes and whitish dentated shades border the veins terminally, becoming pointed at the fringes which they interrupt with pale dots. Beneath, pale, powdered with carneous, with faint discal dots and diffuse but little darker borders in the male, hardly expressed on the paler hind wing. *No distinct common subterminal line.* Hind wings above testaceous fuscous, with broad diffuse darker borders and reduced dot. Thorax cinereous, with an attenuate median and an upper marginal line on the collar. Guenée says: "Une seule ligne noire, fine, sur le collier."

Expanse, 32 to 35 m. m. *Habitat,* New York; Pennsylvania.

The sexes do not, perhaps, differ, but there is a variation in the distinctness of the marginal shades on the fore wings.

The species described below are to be distinguished at once from our only one hitherto noticed, by the shape of the reniform spot which is, so to speak, reversed in appearance, has not the outward inferior prolongation but an upward and inward V-shaped extension. Beneath there is less carneous shading, no or little trace of bordering bands, but a single continued finely undulate subterminal line crosses both pair of wings and is emphasized on the veins by darker dots.

Cloantha evicta, *Grote,* Plate 2, fig. 18, primary wing.

♂.—Color of the preceding but without the brown shading over m. nervules or the paler subcostal shade. More uniformly gray, shaded with pale testaceous brownish, with all the transverse markings more distinct. The geminate transverse posterior line is well expressed by a subcontinuous inner dark line and a succeeding pale shade. The veins are picked out by dark scales. A basal whitish subcostal fleck and black submedian streak. Ordinary lines marked on costal edge. T. a. line discernible, outwardly oblique, approximating to t. p. line toward internal margin. Reniform testaceous with faint marginal line, with an upward and inward extension which may be the fusion of the orbicular but which gives the appearance of a large compound spot notched superiorly. Terminal space testaceous brownish, interrupted by longitudinal pale dashes on either side of vein 3. A terminal dark line forming interspaceal cuneiform marks. Secondaries much as in *ramosula;* the veins are marked with darker scales and the common line of the under-surface is here reflected. Beneath whitish gray of a warm tint, powdered sparsely with dark scales; no borders but distinct discal dots and finely dentate continued subterminal line on both wings. Collar whitish gray, without middle line, but with an upper marginal distinct black line which separates the darker discolorous tegulae.

Expanse, 32 m. m. *Habitat,* New York State.

In both this and the succeeding species the head is larger, the eyes more prominent, and the palpi longer than in C. ramosula.

Cloantha vomerina, *Grote,* Plate 2, fig. 17, primary wing.

♂.—This is best described comparatively. There are no traces, or these are but extremely illegible, of the transverse lines; their absence gives the fore wings a resemblance to those of *C. ramosula.* The reniform spot is shaped as in *C. evicta,* but very distinct, owing to its being distinctly black margined. The whitish sub-costal fleck of *C. evicta* is here more diffuse and extended and touches the shoulder of the thorax. A heavy diffuse brown black shade extends over all the inferior portion of the wing, outwardly running obliquely upwardly to apex and covering terminal space. White linear shadings along veins 3 and 4 on terminal space, and thus a tendency to have these pale shadings accompany all the nervules is exposed, but in both the new species these shadings run *parallel* with the veins. Collar pale without median line but with an upper marginal line against the blackish tegulae. On the front, before the antennal insertion, I notice a gathering of the scales into two slight lateral black tufts, not apparent in *C. evicta.* Beneath much as in *C. evicta;* the palpi outwardly are blackish.

Expanse, 36 m. m. *Habitat,* New York State.

Appears to be a larger species than the others, and at first sight to differ strongly. It is, however, very nearly allied to C. evicta, but I know of no parallel in the genus that would excuse the reference of both under one name.

Litognatha,[14] n. g.

Ocelli. Head with the scales extended tuftedly forwards on the vertex between the antennae. Male antennae with strongly setose pectinations as well as bristles on either side of the antennal stem; along the basal third the pectinations are reduced, and subobsolete on the inside, somewhat gradually becoming more apparent towards a point about one third from the base, where they seem to be massed, giving the stem a tufted or thickened appearance at this point; thus the antennae differ from the simply bristled structure presented in Pityolita. Labial pulpi very long and compressed with appressed squamation. Second joint nearly as long as in Philometra, but more bent; third joint very long, about half as long as the second. Male fore legs with slender curved tibiae and a sparse brush of long hair. [The appearance of the fore legs reminds me of the representation by Poey of Mastigophora.] Abdomen linear, notably long, exceeding the hind wings by about a fourth of its length. Female antennae simple, the setal hairs obsolete over the basal portion of the stem, impectinate, without nodosity; palpi a little shorter and more curved than in the opposite sex.

One of the genera allied to Zanclognatha. In the type, L. nubilifascia, the form of the transverse posterior line is unusual. Both the species I here include are slight and L. litophora reminds me strongly of Pityolita in ornamentation, but may be readily separated on structural characters. As yet I have been unable to make neurational examinations.

Litognatha nubilifascia, *Grote,* Plate 2, Fig. 3 ♂, ♀ 2.

Gray dusted with olivaceous, paler than Pityolita pedipillalis, Transverse anterior line indistinct. Reniform indicated by dots at extremity of cell. Transverse posterior line oblique, a little uneven, not projected opposite the cell as usual, but very slightly outwardly inflected at costa and preceded by a distinct, diffuse olivaceous shade and marked outwardly by a pale line. Subterminal line equally, and thus unusually distinct, similar to the t. p. line in appearance, less oblique. A narrow, distinct, continued marginal line. Secondaries a little paler than primaries with the outer lines of the primaries

[14] Gr.: λιτος et γνάθος.

here continued. Beneath, with the lines repeated, on secondaries a discal dot. A ♂ primary wing measures 12 m. m. along costa.

Habitat, Philadelphia; Buffalo, Olean, Albany, N. Y. (3629, coll. Lintner).

The imago flies in June and July in company with Philometra on low grounds in herbage. Fresh specimens are deeper colored, as the active moth readily loses its scales by attrition.

Litognatha litophora, *Grote.*

♂ ♀.—Of the usual pale gray color, but powdered with brown scales, not olivaceous, as in Pityolita or ochraceous as is more usual in Zanclognatha. The transverse posterior line has the same shape as in Pityolita, but it is *dark brown*, and is continued with nearly the same distinctness across the secondaries which are concolorous. Subterminal shade faint on both wings. Terminal line very distinct, dark brown, fine and subcontinuous. Fringes soiled with brownish. Beneath, the wings are darker than above. The t. p. line is reproduced with great distinctness across both wings. A primary wing measures 12 m. m. along the costal edge.

Habitat, Philadelphia; Albany (♂, 2535, Lintner legit).

Meghypena, n. g.

Ocelli. Labial palpi very long, as long as the thorax; third joint small, porrected, second very long, a little excavate beneath, projected straightly forwards. Primaries wide, swelled at the shoulder, depressed medially, rising to the acute apices below which the external margin recedes, rising again opposite the median nervules; internal margin straight.

This genus differs from Macrhypena in the much longer palpi and acute apices of the primaries. The wings are unusually ample yet proportionate, hence differing from Plathypena with its wide secondaries and narrow primaries. The propinquity of the median lines is noticeable. The species are recognisable from the irrorate character of the ornamentation. Beneath, on the secondaries, this is quite noticeable, the discontinued darker streaklets reminding us of some Geometridae quite strongly. My material is limited to single specimens of either species.

Meghypena velifera, *Grote*, plate 2, fig 7 ♀.

The ground color, which obtains over the basal and terminal fields of the fore wings, is pale ochrey, covered with dark strigae as in the Geometrid genus Endropia. These marks are visible all along the costa. On the internal margin at extreme base the wing shows a dark shade. The first of the median lines is outwardly acutely projected on the median nervure, below which it runs evenly inwardly to internal margin. Above that point it runs inversely to costa, being inwardly dentate below costal nervure. The median space is purply blackish with the ordinary spots black and distinct. The median lines show accompanying deep brownish shades on the median space that meet centrally below the median nervure. Outer median line even, like the inner line in appearance, bent at median nervure and running inwardly below it to internal margin. Subterminal line consisting of an undulating series of clouded blackish spots tipped outwardly by white scales. A large diffuse brown shade lies on external margin below the apices, obliquely margined superiorly. Terminal line dark, interrupted. Hind wings fuscous, without markings, with a dark subcontinuous terminal line, and with the discal mark and strigae of the under-surface reflected; fringes stained with ochreous. A primary wing measures 20 m. m. along the costa.

Habitat, Sharon Springs, N. Y. (O. Meske coll.)

Meghypena lentiginosa, *Grote.*

♂.—Resembles the preceding species strongly in ornamentation but not in color. The primaries are fuscous, but little darker than the secondaries. The median space does not contrast, but dark brown shades line the median lines and extend centrally below the median nervure as in M. velifera. The ordinary spots have the same representation. None of the usual markings contrast on the primaries in this duller-hued species which seems to exceed M. velifera in size, while agreeing with it in the details of the ornamentation, and especially that, on the fore wings beneath, the simple more prominent black dot followed by whitish scales, below the costa, and which inaugurates the obsolete subterminal line, is quite evident. Bearing in mind the variability of Zanclognatha laevigata, *Grote*, and Renia discoloralis, *Guenée*, the union of the two species I here declare seems probable, and yet the effect produced on my mind by the specimens I have now under consideration, is that of having to do with two distinct species. It seems unlikely that the bright-hued M. velifera with the pale ochrey ground color of the primaries should be specifically identical with the sombre-hued M. lentiginosa, which recalls in appearance the species of Macrhypena. A primary wing of M. lentiginosa measures 22 m. m. along the costal region.

Habitat, Albany, N. Y. (2339, coll. Lintner).

Family **GEOMETRIDAE.**

Fidonia fimetaria, Grote and Robinson.

Fidonia fimetaria, G. & R., Trans. Am. Ent., Soc. Vol. 3, p. 181, Plate 2, figs. 84–85 ♂, 86 ♀, 1870.

Fidonia halesaria, Zeller, Beitr. z. Kennt. nordam, Nachtf., erste Abth. p. 42 (488) 1872.

This species is from Texas, and represents, as we stated, the European Fidonia fasciolaria in our Fauna. Our comparative remarks are so accurately repeated in the course of Professor Zeller's full description, that it is to be regretted the Professor had evidently not seen our illustration of the North American species.

I am indebted to Professor Hagen, of Cambridge, for a copy of the first part of Professor Zeller's writings on North American Moths, received by me while engaged on the present article.

Family **PYRALIDAE.**

Botis unimacula.

Asopia unimacula, G. &. R., Trans. Am. Ent. Soc., Vol. 1, p. 14, Plate 2, fig. 8.

Habitat, Brewsters, N. Y. (coll. C. T. Robinson). I am inclined to refer this species to the present genus, and to place it near Botis plectilis, *Grote and Robinson*. I accept Professor Zeller's corrected writing of the generic name.

Botis badipennis, *Grote*, Plate 2, fig. 12 ♀.

♂ ♀.—Palpi rather long and narrow, projected, a little dependent, not porrected. Chestnut brown, varying in depth of tint. Ornamentation simple. On the primaries there is a continued blackish slightly arcuate transverse anterior line, distinct, slightly notched before internal margin, and more deeply inwardly on costa where the line is narrower. A large diffuse blackish stain suffuses the discal reniform spot, extending downwards below median nervure.

Transverse posterior line blackish, well removed towards external margin leaving the middle field of the wing wide. It differs by running nearly straightly downwards from its inception which takes place nearer the apices than usual. It is minutely undulate or subdentate to vein 2, below which it is inwardly arcuate, and nearly even to internal margin. A very fine continuous line margins the wing. Fringes concolorous. Secondaries paler, somewhat testaceous, clouded faintly centrally with blackish. A single continued narrow blackish line, continuous with the transverse posterior line of the primaries, crosses the wing. It is minutely undulate and becomes irregularly rivulous inferiorly. The external margin and fringes are more or less stained with light brown, and colored like the fore wings. A similar fine marginal line borders the wing. Body parts concolorous with primaries. Beneath a little paler and duller tinted. A faint discal streak on primaries, none apparent on the hind wings. A common exterior distinct blackish transverse line, which, on the hind wings, is better marked, and not so irregularly rivulous inferiorly as its analogue on the upper surface.

Expanse, 22 to 24 m. m. *Habitat*, Maine; White Mountains, New Hampshire (coll. Prof. A. S. Packard, Jr.).

Eurycreon chortalis, *Grote*, Plate 5, fig. 13 ♂.

♂ ♀.—Head with a frontal projection. Palpi short. Fore wings with the costal edge somewhat convex and with the apices depressedly acuminate. Pale testaceous much shaded with gray, varying in depth of tint and distinctness of markings. Fore wings testaceous, dusted with gray. The veins marked with dusky scales colored like the lines. Discal dots and two inner transverse lines difficult to make out. Transverse posterior line evident, acutely dentate on interspaces, continued. Subterminal line similar but more even and equally apparent, becoming a little diffuse at apices. A narrow terminal line. Fringes concolorous, with dark lines, of which the inner is sometimes interrupted. Hind wings white, with a more or less continued and expressed blackish transverse line running at variance with the more distinct diffuse black serrulate subterminal band which widens to apices and becomes narrow and obliterate toward anal angle. The narrow terminal space between this band and the margin is stained with testaceous; a continued terminal line. Fringes whitish outwardly, dark near the wing, with the inner line apparent. Both the apices of the fore and hind wings are, in one specimen, touched with ochreous. Beneath more dusky, but like upper surface, all the markings are repeated, veins dusky; on hind wings there is a discal liture, and the inner transverse line is seen to run inwardly opposite the discal streak. The wings are subopalescent and diaphanous.

Body concolorous; apparently the caputal squamation is subochreous; abdomen whitish above, more dusky beneath; legs dusky inwardly.

Expanse 24 to 26, m. m. *Habitat,* Albany, N. Y. (coll. J. A. Lintner); Mass. in May (coll. Prof. A. S. Packard, Jr.); Alabama (Grote legit.).

Family **TORTRICIDAE.**

Phaecasiophora,[15] n. g.

Differs from any known Tortricidian genus by the structure of the male hind tibiae. In Penthina the tibiae have a tuft of hairs lying in a depression on the surface of the joint. In Phaecasiophora the joint is covered with long and coarse scales standing out from it and, in *mutabilana,* from their white color, giving the tibiae the appearance of being wrapped in wool or cotton (Plate 2, fig. 6). The form is robust, the abdomen notably long. The palpi are porrect, coarsely scaled, with small third joint. The primaries are rather broad with parallel margins, 12-veined, all the veins separate (Plate 2, fig. 5*a*). Hind wings 8-veined, cell closed by an aborted veinlet, 3 and 4 from one point, 5 immediately approximate (Plate 2, fig. 5*b*).

Phaecasiophora mutabilana. Plate 2, fig. 4 ♀, 5 neuration, 6 ♂ hind leg.

Sericoris mutabilana, Clemens, Proc. E. S. Phil., Vol. 5, p. 135 (1865).

♂ ♀.—Variable in color, either wood-brown or of an ochrey reddish tint. Primaries crossed by three darker, broad, bent, sinuously edged bands not attaining internal margin, with paler interspaces medially traversed by darker shade lines. On the middle band at its outer edge, about the extremity of the cell, is an ill defined whitish spot. Between the middle and outer dark bands

[15] Gr.: *φαικάσιον* et *φέρα.* Kräftig gebant mit verhältnissmässig langem starkem Hinterleib. Von allen mir bekannten Gattungen dieser Zunft durch die im männlichen Geschlechte grob, lang and herauf beschuppten Hinterschienen verschieden (Tafel 2, fig. 6). Durch die weisse Farbe erscheinen die Hinterschienen bei *mutabilana* ♂ wie mit Wolle unhüllt. Vorderflügel breit mit kaum hervortretender Spitze und Penthinen—artigen Zeichnung, auf dem Mittelfelde ein weislicher Punkt; 12 Rippen, alle gesondert, 3 und 4 nicht aus einen Punkte entspringend, Theilungs Rippe unvollkommen (Tafel 2, fig. 5*a*). Hinterflügel mit gleich mässig langen Fransen: 8 Rippen, 3 und 4 aus einem Punkte, 5 gleich dahinter; Theilungs Rippe fadenförmig, aber fortgesetzt (Tafel 2, fig. 5*b*).

the narrower interspace is Y-shaped towards internal angle, enclosing by the inverted limbs a dark spot. A series of costal ante-apical dark dots. The oblique outer band encloses a paler ill defined space on external margin above the angle. Hind wings dark fuscous with pale fringes. Beneath paler, with the central portion of the fore wings fuscous.

Habitat, New York; Pennsylvania; Virginia.

Phaecasiophora? niveiguttana, *Grote.* Plate 2, fig. 15 ♀ primary wing.

Although I only know the female of this species, there seems but little doubt that it belongs here, since it agrees in all apparent characters with *mutabilana* ♀. The ornamentation is so similar that it is best described comparatively. Bright ochreous, the darker markings reddish brown. The darker bands are more attenuate, sinuous, defined by blackish scales, distinct. Two blackish streaks at the base of the wing are quite evident, whereas in *mutabilana* there are but faint indications of their presence. The shape of the external margin of the first transverse band is different; it is acutely projected about the subcostal nervure, lunulate beneath. The white discal spot on the middle band is clear, distinct and defined; there is a black dot (on the succeeding pale interspace) which, owing to the outward angulation of the middle band where it encloses the white discal spot, appears above this latter on the costal region. The outer band is like an inverted Y, owing to its narrower shape, and the limbs being more distinctly expressed by the greater extent of the pale spot on external margin above the angle which they enclose. Costal pale and dark dots distinct and evident. Differs notably from *mutabilana* by the presence of two white apical streaks, the one, shorter, before the apex, the other longer, below it and attaining the extremity of the upper limb of the Y-shaped outer band on external margin. Hind wings fuscous. Beneath both pair are pale fuscous, darker than in *mutabilana*, with distinct costal striations.

Habitat, Pennsylvania.

Penthina Blakeana, *Robinson*, Plate 2, fig. 8, primary wing.

Head and thorax brownish; primaries with a large brown basal patch, much as in fasciatana (*Clemens*), from which this species differs by the twice broader whitish succeeding interspace which has a faint pink hue, and by its width narrows the median dark brown *oblique* continuous band of the wing which is toothed outwardly at the center. Costal points distinct; the apical darker shading is reduced and limited by a curved shade line. Hind wings fuscous with pale fringes. Fore wings with the fringes tipped with dark scales to about the middle of external margin.

Habitat, Pennsylvania (C. A. Blake).

Penthina matutina, *Grote,* Plate 2, fig. 9, primary wing.

White. Head and thorax whitish. Primaries whitish with scattered dark scales; basal patch incomplete superiorly about the middle of the wing, with scattered dark costal scales. Middle brownish band continued with distinct edges marked by blackish scales. The succeeding whitish underspace is contracted medially by the more diffuse apical clouding which extends beyond the curved line. Costal marks minute. Beneath fuscous with whitish costal edge and more distinct regularly divaricate dark streaks.

Habitat, Texas (*Belfrage,* $^{22}/_{5}$).

I have only a single specimen in which the secondaries are defective, but the species is quite distinct from *Blakeana,* which it resembles.

Penthina torenta, *Grote,* Plate 2, fig. 10, ♂.

I refer this very distinctly marked and easily distinguished species with some hesitation to the present genus. Uniformly dark silky wood brown. The primaries are crossed centrally by two parallel slightly arcuate livid raised metallic lines. Three costo-apical pale dots supported by metallic drops, the third surmounting the narrower metallic terminal line which is interrupted on submedian interspace; fringes burnished. Under the glass the squamation is seen to consist of dark scales with paler overlying tips. Hind wings fuscous with pale fringes. Beneath paler, silky; fore wings with an ochreous stain, pale costal streaks and a faint even pale terminal shade on the margin followed by a dark hair line.

Habitat, Pennsylvania.

Grapholitha distema, *Grote.*

A tiny blackish silky species resembling the European *compositella,* but with only two white lines on the internal margin of the primaries. Eight white costal marks disposed in pairs, crowded towards the black apices and becoming straighter and shorter; the first pair more oblique and divaricate. A silvery subterminal streak runs from opposite the cell over the median nervules tapering to internal angle. Secondaries fuscous with pale fringes. Beneath iridescent, greenish in certain lights, with minute white costal dots over the outer half of the wing. Body scales beneath whitish.

Habitat, New York; Pennsylvania.

Family **TINEIDAE.**

Oeta gemmata, *Grote.*

Among a collection of Lepidoptera received by the American Entomological Society from Professor Poey, of Havana, and which collection has been the subject of several papers[16] in the Proceedings of that Society, is a specimen in excellent conservation, bearing the number 821, and belonging to the genus Oeta, *Grote.* This little moth is of a most brilliant golden orange, and the markings of the fore wings are similar to those of our United States Oeta compta *Clemens* sp. (=Deiopeia aurea *Fitch*, as suggested, probably correctly, by Mr. Stretch). It is one-third smaller than our species. There are, as usual, four bands composed of white dots on a blackish ground, but here the dots are smaller and linear, appearing as interrupted streaks and allowing the darker ground color of the bands to obtain. But the bands themselves are narrower in O. gemmata, so that the golden appearance of the wings is much less interrupted than in O. compta. The third band is furcate before costa, while the fourth, covering internal angle, is not connected with the outer limb of the apical furcation, as in O. compta. The hind wings are smoky hyaline, becoming darker exteriorly. The smoky abdomen has a bluish reflection. The legs, palpi and face are dark with white points. The basal joint of the fore legs is golden outwardly. Altogether, this is a narrower insect that O. compta, and very evidently a smaller species. The Cuban specimen expands 23 m. m., while the fore wings at their greatest breadth near the external margin measure 3 millemêtres.

Professor Zeller characterizes Oeta punctella (*Cramer*) comparatively with O. compta, in the Stettiner Entomologische Zeitung, p. 178, 1871. Cramer describes his species from Surinam, while Professor Zeller seems to hesitate to regard his So. American specimens as belonging to a distinct species from our United States O. compta.

[16] *Grote*—Notes on the Sphingidae of Cuba, Proc. E. S. Phil., Vol. 5, pp. 33-84, 1865; Notes on the Bombycidae of Cuba, *id.*, pp. 227-255; Notes on the Zygaenidae of Cuba, *id.*, Vol. 6, pp. 173-189, and pp. 297-334, 1866-7; List of the Sphingidae, Aegeriadae, Zygaenidae and Bombycidae of Cuba, Trans. Am. Ent. Soc., Vol. 3, pp. 183-188, October, 1870.

The Professor has not compared Cramer's figure, which seems to me to bear out the Professor's description in having much less yellow and being blacker on the primaries. While Cramer's figure but indifferently recalls O. compta, it cannot possibly represent O. gemmata. Had Cramer drawn our new Cuban species we might expect a splash of gold color to have represented the fore wings instead of the dark dotted appearance of these in the figure of O. punctella, judging from his known rough manner of illustration. But we probably have to do with three species, whereof O. compta from North, is a near ally of O. punctella from South America, while our insular O. gemmata is far prettier, smaller and brighter than either.

VII. A Study of North American Noctuidae

BY AUG. R. GROTE.

[*Read before this Society, July 2d*, 1873.]

In the present Paper I have continued my observations on the North American Noctuidae, preliminary to the publication of a List of the species upon which I have been for some time at work. The species, referred by M. Guenée to Hadena and Mamestra, I have now examined for the first time, with a view of testing the generic determinations of the celebrated French entomologist. I have found on a near study, that these species are not generically separable on the characters laid down in the Spécies Général, and why certain of the species are in that work referred to Mamestra instead of Hadena, or the reverse, I have been unable to understand.

I have then changed a number of M. Guenée's generic determinations and have suppressed certain genera where I have become satisfied that the distinctions are not valid. It is difficult for the American student at first to study this Group without the prejudices he involuntarily entertains from the works of those English and French authors, in which alone he finds our species described. It is impossible to arrive at any critical views on the subject without a study of certain German authorities, with whose generic conceptions, but more especially with whose manner of zoölogical thought, we have not been sufficiently familiar. It will be of no use to attempt to write upon our Moths, without a study of the writings of Lederer, Zeller and Herrich-Schaeffer. To the latter we owe an appreciation of the characters offered by the venation and its correct terminology; to the former the most conscientious and strict classification that has yet been offered to the student.[1]

[1] The student is also referred to the Annales de la Societé Entomologique Belge, for a number of praiseworthy observations on the Moths, as well as to Dr. Speyer's work on the geographical distribution of the Lepidoptera of Germany and Switzerland. The former Society had the honor of printing Lederer's last communication, "Contributions á la Faune des Lépidoptéres de la Transcaucasie." I need not say that the Wiener Entomologische Monatschrift is to the student of to-day what the Wiener Verzeichniss was to the student of the last century, nor that every word written by Lederer will make itself remembered.

I take the present occasion of thanking Mr. Theo. L. Mead, of New York, who has sent me a collection of Noctuidae for study; in the present Paper I describe several new species he has taken in Colorado. To Mr. J. A. Lintner, of the State Museum, I am under renewed obligations for the loan of material.

Agrotis auxiliaris, *Grote.*

♂.—Abdomen flattened; fore tibiae spinose; form elongate; habitus recalling the European yellow-winged species. Fore wings with distinct ornamentation. Cinereous along the costal region and subterminal space; blackish, shaded with carneous on the median and basal spaces. Basal half-line followed and preceded by determinate black shades; t. a. line distinctly geminate, outer line marked with black; a faint carneous shade over basal space inferiorly; claviform wide, distinctly margined inferiorly, from its extremity to subterminal line a rigid carneous shade borders vein 2 superiorly; orbicular cinereous, decumbent, irregularly oval; reniform large, of the usual shape, touching the gray costal region above; with an attenuated inner darker annulus, followed by a faint carneous streak; t. p. line regular, even, formed by slight black lunulate marks; subterminal line irregular, marked within by two black cuneiform spots opposite the cell and others precede the line inferiorly; terminal space dark, narrow; terminal line continuous, black, slightly interspaceally lunulate; fringes fuscous, with an internal pale line. Hind wings smoky, deepening in tint to external margin, without marks, subiridescent; fringes whitish, fuscous at base with a darker line. Beneath, a tuft of testaceous hair at base on median vein of primaries; both pair pale, subirrorate, with a rather distinct common darker shaded line and discal dots. Body ashen, collar lined, abdomen with the anal and lateral hairs stained subcarneously.

Expanse, 45 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 57).

Agrotis repentis, *Grote and Robinson.*

The transverse posterior line is regular, formed by little black lunulate marks, which extend outwardly along the veins to the outer component line which is sometimes wanting, but occasionally appears as an even distinct shade. Median shade sometimes distinct and diffuse, again, as in the Colorado specimen, improminent. Fore tibiae spinose.

Habitat, Atlantic District; Colorado Territory (coll. Theo. L. Mead, No. 33).

Agrotis balanitis, *Grote,* Plate 3, fig. 14, ♀.

♀.—Resembles *repentis* in general appearance, color, and size; fore wings a little darker with a pale costal reflection; ordinary lines blackish, perpendicular; t. a. with the outer component line black, dentate; orbicular, moderate, a little pointed outwardly; reniform incomplete, both spots concolorous, with narrow black annuli and pale gray inner edging. Median shade apparent on the median space below the nervure. T. p. line irregular, incompletely geminate, unevenly dentate, running inwardly below median nervure, and hence differing from *repentis,* where it is even, nearly perpendicular, and does not run in inferiorly. Subterminal line much as in *repentis,* preceded by a dark shade. Terminal line broken into dots; fringes concolorous; hind wings pale smoky, without marks or border; fringes whitish, with a faint interior line. Beneath, pale, with discal dots, and a common transverse line broken into nervular marks on the hind wings.

Expanse, 40 m. m. *Habitat,* Colorado Territory (coll. Theo. L. Mead, No. 34).

This species offers a resemblance to *Lycarum* H.-S., fig. 122. Beneath, the abdomen, in A. balanitis, is laterally marked by a stigmatal black line.

Agrotis atrifrons, *Grote.*

♀.—Antennae simple, scaled, ciliate, with scattered hairs, not bristled beneath; ocelli; eyes naked; spurs short on middle and hind tibiae; fore tibiae spinose. Head with pale supra-caputal vestiture projected between the antennae; the clypeal scales are black and contrasting. Collar with a black line. Thorax above ashen. Fore wings ashen shaded with reddish brown; ornamentation simple. Transverse lines narrow, black, single, continued, t. p. line narrowly lunulate. Nervules marked terminally with dark scales. No trace of the ordinary spots. Median vein at base marked with blackish scales. The wing is shaded at base, above and below the m. nervure, with reddish; again diffusely over the discal cell, and less obviously on the median space below the median nervure. Subterminal space dark, shaded with reddish brown, and bringing the subterminal line into relief by its contrast with the purely pale ashen terminal space. Hind wings white, smoky along the hind border, and the veins are also marked; fringes white, with a faint smoky interior line. Beneath whitish, costal region of hind wings irrorate, no discal dots on either surface; the primaries show a faint discal dot, and there is a common blackish exterior line distinctly marked on costal

region, discontinued below the dusty margin of the hind wings. Labial palpi dark, third joint concealed.

Expanse, 35 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 32).

Agrotis mimallonis, *Grote.*

♂.—Ocelli; antennae long, bristled beneath (borstenformig), tapering; eyes naked; head and thorax thickly haired, caputal squamation directed forwards between the antennae; all the tibiae spinose; middle and hind tibiae spurred. Head, thorax and fore wings dull purple red. Primaries with simple ornamentation. Transverse lines obsoletely geminate, blackish. T. a. line twice slightly waved to vein 1, below which it is outwardly projected to the margin. Orbicular with a blackish central dot alone apparent. Reniform with a luniform blackish central shade which is alone noticeable. The transverse lines are marked by black scales on costal region. T. p. line with its inner line alone distinct, this is narrow, continued, equally distinct throughout its length, but little projected, regularly lunulate, blackish. Subterminal line pale, indistinct, near the margin. Ante-apical pale costal dots. Blackish scales about the veins on the terminal space; terminal line subobsolete; fringes concolorous. Hind wings pure white, dusted a little apically with ashen scales and a faint ashen terminal line; fringes white with a faint middle line more apparent apically. Beneath, the hind wings are white, with a discal dot, and determinately powdered with purple and ashen scales over costal region. Fore wings fuscous centrally, with the costal region and terminal margin purplish; a faint discal dot and two exterior darker shade lines. Feet and tibiae fuscous, dotted with pale marks; femora and thorax beneath thickly haired, purple-red. Thorax above without crests. Abdomen pale, somewhat ochreous, stained laterally and at the anus with purplish, somewhat flattened, untufted.

Expanse, 38 m. m. *Habitat*, New York (coll. Theo. L. Mead, No. 117).

Agrotis fumalis, *Grote.*

♂.—Ocelli; eyes naked; antennae long, bristled beneath, tapering; middle and hind tibiae spurred; all the tibiae spinose. Habit and ornamentation of *violaris*. Dusky ashen; ornamentation simple. Fore wings with the blackish t. a. line nearly perpendicular, very slightly lunated and notched on the cell. Median shade and orbicular obsolete. Reniform a lunated blackish stain. T. p. line even, continued, a little roundedly exerted opposite the cell, resembling that of *repentis* in appearance, formed of regular small lunulations with the black-

ish scales running outwardly to where the outer component line would be if it were present. Subterminal line faint, merely indicated by the paler terminal space, preceded by a darker shading which forms a determinate blackish costal shade before the line. A pale line at base of the dusky fringes. Hind wings dusky, a little paler and semi-hyaline at base, nearly like the primaries in tint, with no determinate border or discal mark save by reflection from the under-surface. Fringes with a pale basal line. Beneath paler, more whitish; luniform discal mark on hind wings distinct, black, fainter on fore wings. A common exterior darker shade line with faint traces of a subterminal shade. Head and thorax dusky ashen; abdomen concolorous with hind wing. Feet and tibiae blackish, pale dotted.

Expanse, 40 m. m. *Habitat*, New York (coll. Theo. L. Mead, No. 130).

Agrotis 4-dentata, *Grote and Robinson.*

Habitat, Colorado Territory (coll. Theo. L. Mead, No. 63 ♂).

Agrotis subgothica, *Haworth.*

Agrotis jaculifera, Guenée, p. 262, Plate 5, fig. 4.

Habitat, Atlantic District; Colorado Territory (coll. Theo. L. Mead, No. 62).

Agrotis herilis, *Grote.*

Agrotis jaculifera, Guenée vars. A. & B. p. 262.

♂ ♀.—Resembles the foregoing so that a comparative description will best distinguish it. Larger than *subgothica*, of a purplish black color, and hence much darker than *subgothica*, with which it coincides in the ornamentation of the primaries above. The t. a. line below the median nervure is more outwardly rounded, less perpendicular; the prominent claviform is shorter. The ordinary spots are similar in the two species, but the reniform is discolorous in *subgothica*, stained with ochreous, with a distinct internal ring, whereas the internal ring is feebly marked and the spot is simply pale carneous, like the orbicular and the pale nervular squamation, in *herilis*. The t. p. line is more distinct and black in the new species. Hind wings smoky blackish, deepening in color terminally, not pale with a hind border as in *subgothica*. On the fore wings above there is a notable contrast between the paler subterminal space and the extended paler marginings to veins 3 and 4 in *subgothica*, and the obscurely carneous coloration of the same parts in the new species, which latter wants the decided prolongation of pale scales along the inferior veins.

Expanse, 38 to 43 m. m. *Habitat*, Atlantic District; of common occurrence. I have taken this species in Central Alabama.

This is the *Agrotis subgothica* of American Agricultural Publicatoins, such as the 1st Missouri Report, page 82, fig. 29. It is not the Agrotis subgothica of English writers, which is A. jaculifera *Guenée*. Stephen's figure of Agrotis subgothica, Plate 22, fig. 3, and description, page 126, Haust. II, is decisive. The peculiar discoloration of the reniform spot distinguishes A. jaculifera, and the paler hind wings, greater extent of pallid shades on the fore wings and smaller size are characteristic and are all well rendered by Stephen's illustration. When I was in France, M. Guenée stated to me that he had discovered the fact, that his Agrotis jaculifera was the same as the Agrotis subgothica of English writers, and also that he believed that the form now described as Agrotis herilis was a distinct species; the latter contrary to the statement made in the Spécies Général. Agrotis subgothica is figured on Plate 1, fig. 11, in the 1st Missouri Report correctly, but under its synonym of *Agrotis jaculifera*, which latter name I retained for the species in determining the Noctuidae of the collection of the American Entomological Society, whence Mr. Riley received his determination. I was not then able to examine the English authors, who first noticed our species from specimens accidentally introduced into their country. Mr. Riley's figures of A. herilis, above cited, have been copied, with the erroneous determination, by Eastern writers.

Agrotis sexatilis, *Grote.*

♂ ♀.—Ocelli; eyes naked; all the tibiae spinose; middle tibiae with one, hind tibiae with two pair of spurs; ♂ antennae bristled, ♀ simple, oviduct slightly produced. Ornamentation typical, in color like A. plecta, than which this is a larger species. Costal edge broadly whitish in ♂, ashen in ♀, ordinary spots very large, separated, preceded and followed by black scales, variable in tint. Median lines black, tolerably distinct. Internal margin, from the base of the wing to transverse posterior line, broadly and diffusely shaded with blackish. Subterminal space broadly shaded with dull purple reddish, smooth; this tint spreads inwardly below vein 2 over the median space to the prominent black-edged claviform spot. Subterminal line improminent. A narrow terminal black line interspaceally accentuated. Hind wings dark fuscous, without border or spot in ♀; whitish with smoky posterior shading in ♂. Beneath dusky, with very faint traces of a common line and discal spots. Fringes of the hind wings above whitish with an interior dusky line.

Expanse, 36 to 38, m. m. *Habitat,* New York; Colorado Territory (coll. Theo. L. Mead, No. 66).

Differs from Guenée's description of N. ochrogaster by the blackish collar and the median nervure not being white; the terminal line on the primaries is succeeded by an even pale line, the base of the dark fringes. The hind wings have no terminal series of rounded dots. It is, I think, nearer allied to A. herilis and A. subgothica.

Ufeus, n. g.

Ocelli. Eyes very small, naked, with lashes. Head comparatively small and sunken. Maxillae weak and comparatively short. Labial palpi short, apical joint undistinguishable by reason of the long and coarse hairy vestiture. Middle and hind tibiae spinose; fore tibiae unarmed, with a slight tuft at the middle of the joint; tarsi thickly spined. ♂ Antennae simple, under the glass showing two pair of fine short bristles on each joint. Head and thorax thickly clothed with long hairs, recalling Euthisanotia, but here the thoracic vestiture is silky, longer and more appressed. Body flattened, recalling Orthosia; sides of the abdomen with long hairs, and the anal segment is densely pilose. Armature of the legs weak and short; hind tibiae with two pair, and middle tibiae with one terminal pair of aborted spurs. Legs coarsely fringed with long hair like that on the body beneath. The vestiture is unlike that of the ♂ Leucania pseudargyria, not surrounding the joints. The genus appears related to Agrotis, and the type, U. satyricus, has a peculiar Blatta-like appearance from its flattened form, simple antennae, dark color, want of ornamentation, rather coarse and thin alar squamation, and rounded external margin of primaries with blunted apices.[2]

Ufeus satyricus, *Grote,* Plate 3, fig. 4, ♀.

♀.—Dark dull wood brown, unicolorous. Tongue bright testaceous. Fore wings with a faint tracing of an irregular, diffuse, darker-shaded transverse anterior line. An undefined blackish mark takes the place of the reniform. Transverse posterior line a little more distinct than the t. a. line, nearly even, not much projected, perpendicular and slightly indented opposite the cell. The transverse lines have the effect of darker shadows thrown across the wing. No subterminal line. A series of interspaceal blackish terminal streaks of variable distinctness and length. Hind wings pale, somewhat dirty testaceous in hue, subhyaline, allowing the veins to be distinctly seen, without

[2] In using Lederer's analytical table, the untoothed antennae will separate the present genus from Ammoconia.

marks; internal margin clothed with coarse hair. Beneath, the hind wings show a discal ovate blackish spot about the cross vein, and a very faint tracing of a subterminal band.

Expanse, 45 m. m. *Habitat*, Canada (coll. Wm. Saunders, February); Albany, N. Y. (coll. J. A. Lintner, $^{2}/_{14}$).

Ufeus plicatus, *Grote.*

♂.—Smaller than *U. satyricus*. Body of the same flattened shape and color but the fore wings show a uniform, warm, faintly reddish tinge. T. a. line broken. Along the cell, above the median vein, is an interrupted black streak. Transverse posterior line black, comparatively very distinct, running outwardly and downwardly obliquely from costa, much and roundedly exerted opposite the cell and offering a distinguishing character by its course as compared with that of *U. satyricus*. It appears interspaceally lunulate from a short extension of the black scales upon the veins beyond the line. A series of fainter blackish interspaceal terminal streaks. All the markings are determinate, not reflected. Hind wings dull testaceous above, and, with the upper wings, beneath, absolutely without marks or lines of any kind.

Expanse 40 m. m. *Habitat*, Philadelphia.

I cannot regard these as sexes of the same species owing to the difference in the course and appearance of the transverse posterior line. These two species cannot be referred to Mythimna, which is restricted by Lederer to the European M. imbecilla. Apparently Mr. Walker's extension of the term to include Guenée's Leucania pseudargyria, etc., should not be followed.

Mamestra imbrifera.

Aplecta imbrifera, Guenée.

Habitat, Atlantic District. The eyes are hairy.

Mamestra purpurissata.

Eurois purpurissata, Grote.

Habitat, Atlantic District. Represents the European M. tincta in our fauna.

Mamestra nimbosa.

Aplecta nimbosa, Guenée.

Habitat, Atlantic District.

Mamestra latex.

Aplecta latex, Guenée.

Habitat, Atlantic District.

Mamestra grandis, *Lederer.*

Hadena grandis, Guenée.

Habitat, Atlantic District.

Mamestra Farnhami, *Grote*, Plate 3, fig. 2, ♂.

♂ ♀.—Eyes hairy; fore tibiae unarmed; antennae simple, very shortly ciliate beneath in ♂; palpi porrect, with small projecting third article; abdomen with moderate basal tufts. A little smaller than *Mamestra grandis;* remarkable for the unusually sharply defined W-mark, the varied tints and the pale oblique streaked shade on median nervure below the ordinary spots, in which character it simulates *Prodenia commelinae.* The ground color of the fore wings is blackish with a dark green cast, and obtains over the median and terminal spaces. Subterminal space, median space along internal margin, and basal space before the t. a. line, pale reddish brown with a purple reflection. T. a. line thrice waved, geminate, with pale internal shade; basal half-line similar. Orbicular outwardly oblique, moderate, pale, with a dark shaded center, finely ringed with black. Reniform elongate, incompletely ringed, with an inner shaded annulus. T. p. line forming a single inward arcuation opposite the cell; below vein 5 it runs straightly, interspaceally lunate, to internal margin. Subterminal line very distinct, pale, commencing with a pale yellowish apical patch and forming the usual W-shaped mark, the points closing on the extremities of veins 3 and 4, preceded on the subterminal space by interspaceal dark dashes before which are pale scale points. Terminal line black; fringes with a pale basal line and interrupted at the extremity of the nervules with pale scales. Hind wings pale with blackish borders and discal mark; veins marked with dark scales; terminal line forming broken black interspaceal marks; fringes pale subtestaceous. Beneath pale, faintly reddish, powdered with dark scales and with a continued common extra discal line and partly annulate discal marks; on primaries the pale subterminal line feebly reflected.

Expanse, 42 m. m. *Habitat*, Colorado Territory (♀ Mr. Jas. Ridings; ♂ Mr. Theo. L. Mead, No. 45).

Named in memory of Charles Severance Farnham, *who died, May, 1862, at Yorktown, in the service of his country, and was one of the early Curators in this Society.*

Mamestra brassicae (*Linn.*).

Habitat, New York. Our species does not seem to differ from the European.

Mamestra albifusa.

Hadena albifusa, Walker, p. 753.

Habitat, New York; Nova Scotia.

Mamestra chenopodii (*W. V.*).

Hadena chenopodii, Guenée.

Habitat, United States and Europe.

Dianthoecia meditata, *Grote.*

♂ ♀.—Size moderate; form compact; ♂ antennae with the edges of the joints relieved and furnished with short cilial tufts; ♀ abdomen pointed with extruded oviduct; eyes hairy. Dark colored, fore wings uniformly dark with faded ornamentation. Fuscous with pearly mottlings caused by a sparse admixture of white scales over the thorax and primaries. Transverse lines perceivable by pale centerings. Basal half-line twice waved. T. a. line perpendicular, thrice waved. The wing is more or less tinged with rufous over the median space on which the ordinary spots are with difficulty to be perceived; they are dark-circled, picked out by pale scales, concolorous. Above the reniform the t. p. line is incepted on costa by pale scales. The line is of the usual shape, slightly inwardly arcuate below median nervure, slightly lunulate. Three pale ante-apical costal dots. Terminal space nar row, paler than the rest of the wing; fringes silky, dark. Hind wing unicolorously dark fuscous; fringes whitish with a dark line. Body parts concolorous. Beneath a little paler, especially the hind wings, mottled with white scale points, with a common exterior line and discal dots.

Expanse, 30 m. m. *Habitat,* New York State (coll. B. S. N. S.; J. A. Lintner; Theo. L. Mead, No. 129).

This is an obscurely colored species very different from Dianthoecia capsularis (*Raphia propulsa,* Walker), but sharing the structural features that separate the genus from Mamestra. It is the third described N. Am. species, unless others are described, under some other generic title, by Mr. Walker in the British Museum Lists. It may be remarked here that a condemnation of Mr. Walker for an occasional erroneous determination in the

moths, or a vague and useless diagnosis, would be without sufficient point. But the fact has become apparent that the whole 35 Parts of the British Museum Lists, when compared with the collections, contain such a mass of error, that in their present shape they are unavailable to the student. I have ever expressed myself as desirous of retaining all Mr. Walker's tenable names, but from the vague descriptions it will require independent testimony to identify his types, even those in the British Museum collection. It is inconceivable that the Authorities of the British Museum should have permitted the publication of these Lists, which could not be desired by science, since they are, for the most part, based upon M. Guenée's work, and merely add a large number of inferior descriptions to what we had before us in a useful shape.

Oncocnemis Dayi, *Grote,* Plate 3, fig. 8.

♂.—Eyes naked, strongly lashed; tibiae all unarmed but with a stout claw at the extremity of the shorter anterior pair; all the *tarsi* spinose; head not retracted; clypeus without prominence; abdomen smooth, not tufted; ornamentation Hadena-like; antennae simple; size moderate; corporal vestiture hairy. Fore wings and thorax mixed white and brown, brightly contrasted. T. a. line not very distinct, black, thrice waved, the last time sharply below vein 1 on the margin. Ordinary spots distinct; claviform pale; orbicular round, black ringed, pale with deep brown rounded center; median shade apparent edging the reniform on the inside, approximate to t. p. line; reniform large, with brown center, followed by a whitish shade which fills up the space left by the superior exsertion of the t. p. line, and is characteristic of the species. T. p. line even, black, followed by a whitish shade; subterminal space deep brownish, with a series of broad black interspaceal dashes which are very distinctive and precede the inward dentations of the whitish, irregular subterminal line; terminal space dark at apices and faintly so centrally, but below the apices this is mixed with pale scales which form a narrow whitish edging before the black terminal line, the latter interspaceally sublunulate and interrupted on the veins; fringes with a central dark line and interrupted with pale scales opposite the extremity of the veins. Hind wings rather bright clear yellow, dusky at base, with a distinct broad marginal black band; fringes yellowish at base, with a dark line beyond which they are whitish. Beneath pale yellow; the costae irrorate with dusky scales; a terminal black band which, on the fore wings, is superiorly a little removed from the margin and has its outer edge

a little irregular; a terminal black line and fringes as on upper surface; minute and faint discal dots.

Expanse, 32 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 17).

The occurrence of this genus in America is not noticed before. The hitherto described species are from the Ural Mountains, and have been taken in the evening on flowers according to Lederer. At first sight our species might be taken for Anartas allied to A. luteola, *Grote*, and the European A. cordigera, but the naked eyes, Hadena-like ornamentation, and the claw on the fore tibiae quickly distinguishes them. This claw in On. Dayi, is shorter, stouter and blunter compared with a second species, which I describe here, and which equals On. Dayi in expanse, but in which the colors of the primaries above are less distinctly contrasted, while in general appearance the two species resemble each other strongly from the similarity in color of the hind wings. From the yellow-winged European species of Agrotis, sometimes referred under a distinct name to Triphaena, and which the present species casually resemble in the appearance of the hind wings, Oncocnemis differs structurally, among other characters, by the non-spinose middle and hind tibiae.

It is with great pleasure that I name this species after David F. Day, Esq., of this Society, a scientist whose reading is exhaustive, and a friend whose kindness is enduring.

Oncocnemis Hayesi, *Grote*, Plate 3, fig. 13.

♂.—Eyes naked, strongly lashed; tibiae all unarmed but with a strong and rather long claw at the extremity of the anterior pair (vide *Lederer*, Plate 4, fig. 2); all the *tarsi* spinose. In all its structural characters this species agrees with On. Dayi, except that the claw is longer and the eyes and head a little smaller and less prominent. The primaries are dull pulverulent yellowish ashen with distinct lines, but not contrasted in their shading. The t. p. line is distinctly continuous, shortly dentate. The ordinary spots are large and rather vague; the orbicular larger than in On. Dayi. The subterminal line is whitish, powdery, contrasting; fringes improminently chequered. Hind wings, light, bright yellow, dusky at the base and along the veins; the dusky scales form an incomplete line crossing the cell over the cross-vein and running to internal margin; a wide terminal black

band broader than in On. Dayi; fringes yellowish, with a dusky line, whitish at tips. Beneath yellowish, with terminal black bands which, on the fore wings, are not removed superiorly from the margin as in On. Dayi; minute discal dots.

Expanse, 32 m. m. *Habitat*, Colorado Territory (No. 18, coll. Theo. L. Mead).

This beautiful species is very distinct from Oncocnemis Dayi in the ornamentation of the primaries, which latter have more the appearance of those of the European O. diffusa (H.-S. figs. 44–45). Our species at once differ by their distinctly yellow hind wings. The geographical distribution of the genus is very interesting, since it increases the zoölogical homogeneity of the present Arctogaeal province. The ocelli are present in all our species, and the maxillae long, stout, black and corneous.

I respectfully dedicate our second species of the genus to Doctor George E. Hayes, Vice-President of this Society, whose observations on the Geology of Buffalo, have materially increased our knowledge of our locality.

Oncocnemis Chandleri, *Grote*, Plate 3, fig. 9.

♂.—Eyes naked, strongly lashed; all the tibiae without, all the tarsi with spines; fore tibiae with a strong claw. Fore wings gray, mixed black and white, distinctly contrasted and with longitudinal black streaks, resembling in this respect *On. Dayi*. A distinct black dash runs from the base of the primaries to the long, black-margined claviform. Transverse lines indicated on costal region, else obsolete. The appearance of the gray ordinary spots is very peculiar; they are fused by a common black edge and distinct shaded fillings. The compound spot assumes a decumbent funnel-shape. Very evident longitudinal black dashes precede the white dentate subterminal line interspaceally. Fringes alternately paler and darker. In the ornamentation of the primaries this species remind us of *Cloantha*. The terminal space is dark and concolorous in *On. Chandleri*, whereas it is paler than the subterminal in *On. Dayi*. Hind wings pale fuscous or smoky, with a diffusely margined, wide, blackish hind border, which, in one specimen, does not contrast greatly with the rest of the wing. Beneath paler than above, with terminal blackish borders and minute discal points.

Expanse, 32 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 27).

Quite distinct from the species with yellow hind wings, this resembles On. Dayi, rather than On. Hayesi, in the ornamenta-

tion of the fore wings, while in the appearance of the hind wings it comes nearer to the European species.

I respectfully dedicate this species to Mr. Henry Chandler, Vice-President of this Society, and a distinguished Patron of the Natural Sciences.

Hadena arctica, *Boisduval.*

Hadena amputatrix, Fitch.

Habitat, Atlantic District.

Hadena Bridghami.

Mamestra Bridghamii, Grote and Robinson.

Habitat, Rhode Island.

Hadena adjuncta.

Mamestra adjuncta, Guenée.

Habitat, Atlantic District. The eyes are naked.

Hadena devastator.

Phalaena devastator, Brace.
Mamestra ordinaria, Walker.

Habitat, Atlantic District.

Hadena dubitans.

Apamea? insignata, Walker, p. 729.
Mamestra dubitans, Walker, p. 232.

Habitat, Atlantic District.

I have compared Mr. Walker's types in the collection of the British Museum. The species varies in depth of ground color; the eyes are naked. (Number 90, Chas. A. Blake, Phila.; Number 95, Theo. L. Mead, New York.)

Hadena impulsa.

Mamestra impulsa, Guenée.

Habitat, Atlantic District.

I have not been able to identify Mamestra passer, *Guenée.* It is impossible to say to which genus it really belongs.

Hadena apamiformis.

Xylophasia apamiformis, Guenée.

Habitat, New York State.

Hadena rurea (*Fabr.*).

Habitat, New York State.

Not distinguished from European specimens.

Hadena lignicolor.

Xylophasia lignicolora, Guenée.

Habitat, New York State; Pennsylvania.

Hadena aurantiicolor, *Grote.*

♂. Nearest, perhaps, to *lignicolor*, much brighter and more distinctly marked. Eyes naked. Fore wings yellow ferruginous, deeper shaded below median nervure. Reniform pale. Transverse anterior line dark ferruginous, thrice waved. Transverse posterior line much projected, not distinct, marked by black dots on the veins on the narrow succeeding paler shade. Subterminal line pale, quite irregular, leaving the terminal space blackish above and below the incomplete W-shaped mark. A deep ferruginous dash connects the median lines, as in *sectilis*, on the submedian fold, shaded with blackish scales at t. p. line. Fringes blackish, cut with ferruginous at extremity of the veins. Hind wings pale fuscous with faint line and spot, apparently reflected from under-surface, and terminally darker shaded; fringes of a warm hue. Thorax bright colored; labial palpi rather prominent.

Expanse, 40 m. m.

Two specimens taken July 10th at Twin Lakes, Upper Arkansas Valley, Colorado Territory, at about 8000 feet elevation (coll. Theo. L. Mead, No. 41).

Hadena verbascoides.

Xylophasia verbascoides, Guenée, p. 141.

Habitat, New York State.

Hadena sectilis.

Xylophasia sectilis, Guenée, p. 141.

Habitat, New York State.

Hadena mucens (*Hübner*).——

Habitat, Pennsylvania; Florida (auth. Guenée). Hübner compares this species with *rurea*.

Hadena vulgaris.

Xylophasia vulgaris, G. & R.

Habitat, Pennsylvania.

Hadena confusa.

Auchmis confusa, Hübner Zutraege, 248.

Habitat, New York State; Pennsylvania.

Hadena miselioides, subjuncta, distincta, have been already correctly referred to this genus.

Hyppa xylinoides, *Guenée.*

Xylina contraria, Walker.

Habitat, New York, Pennsylvania.

Brotolomia Iris.

Phlogophora iris, Guenée.

Habitat, New York, Pennsylvania.

Hydroecia inquaesita.

Gortyna inquaesita, G. & R.

Habitat, New York State.

Hydroecia purpurifascia.

Gortyna purpurifascia, G. & R.

Habitat, New York State.

Hydroecia limpida. ——

Gortyna limpida, Guenée.

Habitat, Illinois (Guenée).

Hydroecia cerussata.

Gortyna cerussata, Grote.

Habitat, Pennsylvania. An spec. praec.?

Hydroecia marginidens. ——

Gortyna marginidens, Guenée.

Habitat, Illinois (Guenée).

Hydroecia rutila.

Gortyna rutila, Guenée.

Habitat, New York State.

Hydroecia speciosissima.

Gortyna speciosissima, G. & R.

Habitat, Rhode Island.

Hydroecia nitela.

Gortyna nitela, Guenée.

Habitat, Atlantic District.

Hydroecia nebris.

Gortyna nebris, Guenée.

Habitat, Atlantic District.

Hydroecia nictitans, lorea, sera, immanis, stramentosa, have been already correctly described from our Territory under this genus.

Gortyna cataphracta, *Grote.*

Habitat, Atlantic District.

Represents in our fauna the European Gortyna flavago. Harris *Gortyna leucostigma* is probably the same as Guenée's *rutila;* the name proposed by Harris is preoccupied and cannot be retained in any event. The *Gortyna zeae* of Harris, I have already referred to Achatodes. Guenée re-describes this species under the specific name of *sandix.*

Ablepharon,[4] n. g.

Ocelli. Eyes naked. Antennae in both sexes without pectinations, simple, not brush-like, under a higher power with very short pubescence. Tongue

[4] Gr.: ἀ et βλέφαρον.

rather short and weak, testaceous. Wings rather broad; fore wings acute with straight external margin. Thorax rounded in front; abdomen proportioned, without tufts. Tibiae non-spinose; anterior pair slightly thickened. Ornamentation Lucania-like. All lines and spots obsolete; tints neutral; with longitudinal darker shades on the primaries, which, in A. Henrici, broadly contrast. From all the genera allied to Leucania differing by the simple antennae.

Ablepharon Henrici.

Leucania Henrici, Grote, huj. scrip.

Habitat, Atlantic District (Buffalo, June, Mr. Zesch).

Ablepharon evanida.

Leucania evanida, Grote, huj. scrip.

Habitat, Atlantic District (New York).

Ommatostola,[5] n. g.

Ocelli. Eyes naked, strongly lashed. Maxillae comparatively stout, corneous, dark. Antennae scaled above, bristled beneath, with two more rigid spinules on each joint. Robust, thickly haired; thorax large, square in front without tufts; head prominent, eyes large. Wings elongate; primaries with straight costal and rounded external margin.

The want of a clypeal projection separates both Ablepharon and Ommatostola from Nonagria. From Leucania the naked eyes separate our two new genera. From Tapinostola and Calamia the lashes, very prominent in Ommatospila. The simple antennae separate Ablepharon from any of the genera described by Lederer. The present genus seems more nearly related to Tapinostola. In ornamentation and size it approaches Calamia.

Ommatostola Lintneri, *Grote.*

♂.—Size rather large; body stout; abdomen exceeding hind wings, of the usual shape, not pointed, swelled or tufted; thorax hairy; eyes naked, strongly lashed; head large, not retracted; antennae scaled above, bristled beneath. Of the usual yellowish testaceous color; fore wings with the external margin rather full and rounded; costal region shaded with white, and all the veins more or less completely marked with white scales, interrupted with blackish; no markings visible except the t. p. line, which is well indicated by black dots

[5] Gr.: *ὄμμα* et *στολή*.

on the veins; blackish shadings accompany the sub-costal nervure on the cell, the median and internal nervures and obtain terminally, and especially superiorly, on the interspaces; fringes concolorous; hind wings white, with a faint testaceous tinge; nervules obsoletely indicated; head and thorax yellowish testaceous without markings; beneath there are no markings, wings and body whitish; veins on primaries indicated by blackish scales.

Expanse, 40 m. m. *Length of body*, 18 m. m.

Habitat, New York (coll. J. A. Lintner, No. 2588).

Cucullia Yosemitae, *Grote,* Plate 3, fig. 3 ♀.

♀.—Eyes naked, but with lashes; abdomen exceeding the hind wings, but shorter than in *intermedia*, which this species rather resembles in general color, but is much more distinctly marked; as usual the legs are proportionately short, the palpi thickly and finely scaled with small projected terminal joint. Pure dusty gray, not bluish gray, as in *intermedia* and its European allies, but rather brownish; the median lines are well marked and black; a basal black dash on submedian fold, extending to the inward dentation of the t. p. line, more or less distinctly; median lines very approximate inferiorly where the outward dentation of the t. a. line nearly touches the corresponding inward dentation of the t. p. line, above which point the t. p. line is heavily marked between vein 2 and the fold; there is a fine oblique black streak across median space above the submedian fold; t. p. line so contiguous to the empty finely black ringed reniform, that its acute dentations opposite the cell appear as the outer edge of the spot which is obsolete; orbicular empty, finely black ringed, large, rather elongate ovate, lying very obliquely on the cell; a series of blackish interspaceal lines; those between veins 2 and 5 extended inwardly, alternating with the outward dentations of the t. p. line; the subterminal line indicated by pale points on these lines; fringes interrupted at the extremity of the veins by pale scales. Hind wings griseous, with paler fringes and faint indications of a median line; beneath griseous, powdery, with faint discal marks and traces of a common line; body griseous, concolorous, collar with a black line.

Expanse, 42 m. m.

Habitat, California (coll. Theo. L. Mead, No. 29; Yosemite, Oct. 12th).

The thoracic vestiture is displaced on my specimen, so that I cannot observe its peculiarities.

Xylina sculpta, *Grote,* Plate 3, fig. 1 ♀.

♂ ♀.—Eyes naked; middle and hind tibia spinose; frontal tuft very short, improminent, not projectedly bifid, as in the typical species *Xylina Bethunei,* Grote and *Xylina signosa,* Walker.[6] Thorax squared, with the shoulders well defined; abdomen flattened; gray, shaded with blackish, with distinct ornamentation; a basal linear black dash; transverse lines geminate and much as in Xylina capax, *G. & R.,* which this species strongly resembles; t. a. line, with the outer component line best expressed, dentate below costa, running obliquely outwardly in its general course, acuminate on submedian fold where it is connected by blackish scales with an acute inward inflection of the t. p. line at this place, inwardly dentate on vein 1; orbicular sometimes not defined against the ground of the wing; median shade blackish, diffuse; reniform of the usual kidney-shape; t. p. line well projected, interspaceally lunulate, its inner line most distinct and marking outwardly the veins at the point between the lunulations; subterminal line irregular, preceded by diffuse blackish shadings and irregular cuneiform interspaceal marks; sometimes vein 2 is accentuated, but there is no continuation of the streak on median space on the submedian fold beyond the t. p. line; terminal interspaceally dentate line marked by black points. Hind wings rather pale, powdery, with an indistinct continued median dentate line, discal dot and subterminal shade, better expressed in ♀, and a distinct black terminal line interrupted by the veins. Beneath the primaries are dark, with the subterminal line indicated by contrast with the paler terminal space, exterior line indicated on costal region; hind wings pale with the dot, dentate and terminal lines of the upper surface repeated.

Expanse, 40 m. m.

Habitat, Philadelphia (C. A. Blake, Number 42); New York (Theo. L. Mead, Number 119).

Smaller than X. capax, and with the reniform more kidney-shaped; more purely gray and black, less purplish and dark.

Calpe Canadensis, *Bethune.*

Plusiodonta? purpurascens, Walker.

Oraesia sobria, Walker.

Habitat, Canada; New York.

I regret that in our notes on the N. Am. Lepidoptera contained in the British Museum, Mr. Robinson and myself have erroneously considered Mr. Walker's descriptions of this species as earlier. The

[6] Mr. Walker's descriptions in this genus are almost useless; I have identified his *Xylina contraria* as a redescription of Hyppa xylinoides.

synonymy of this species will show the general style of Mr. Walker's determinations in the moths correctly. The species represents in our fauna the European Calpe thalictri.

Lygranthoecia, *Grote and Robinson* (1873).

This genus differs from *Heliothis* in its slender and elongated body parts, and less hairy squamation. From the section *Melicleptria* by the more rounded thorax. The naked eyes have a short frilling of scales beneath. The front is much flatter than in *Heliothis*, and the palpi are more porrected. The frontal scales are not mixed with hair, nor twisted towards a central point, as in that genus. The habitus is more like *Lepipolys*, or even *Schinia*. The shape of the abdomen is like *Heliothis* proper, but the ♀ oviduct is shortly salient and dependent. All the tarsi spinose, hind tibiae with two pair of spurs; middle tibiae with a single unequal pair, whereof one spur very long; fore tibia with terminal spines. The squamation is peculiarly pearly and powdery; the fore wings are divided into fields, as in some species of *Heliothis*, but the sombre hind wings and under-surface do not recall the gay coloration and ornamentation of that genus.

This genus was in manuscript at the time of Mr. Robinson's death. It had been remarked by him that the typical species, Anthoecia rivulosa, had been unjustly used by Dr. Herrich-Schaeffer to criticise Lederer's definition of Heliothis.

Lygranthoecia marginata, *Grote and Robinson.*

Pyralis marginatus, Haworth.
Anthoecia rivulosa, Guenée.

Habitat, Massachusetts to Alabama. The European Chariclea umbra, has for its synonym *Heliothis marginata*, leaving the specific name eligible for this species.

Lygranthoecia Thoreaui, *Grote and Robinson.*

Anthoecia Thoreaui, Grote and Robinson, Trans. Am. Ent. Soc., Vol. 3, p. 181, Plate 2, fig. 80, 1870.

Habitat, Pennsylvania to Alabama.

Heliolonche, *Grote.*

Antennae scaled, pubescent beneath in male, simple in female, in which sex the ovipositor is exserted as in *Melicleptria*; ocelli; front full, not convex;

body thickly and lengthily haired; size small; labial palpi heavily fringed, extending beyond the front; fore wings lanceolate, hind margin long, obliquely rounded, internal angle not prominent. Fore tibiae abbreviate, with a disproportionately heavy claw, else all the tibiae without spines. Eyes constricted; no clypeal tubercle as in *Omia*. Differs from *Melicleptria* in the shape of the primaries. The clypeus, while full, is not projected; the thorax is square, broad, and the whole body lengthily haired.

Heliolonche modicella, *Grote,* Plate 3, fig. 12 ♀.

♂ ♀.—Fore wings obscure purple, with a wide, roundedly oblique, pale yellowish fascia running from costal region, below the apices and costal margin, to just above internal margin, at about basal third, not attaining the base of the wing nor internal margin, which are covered with blackish olivaceous scales that, extending upwardly, partially border the central fascia. On the cell a longitudinal, pale yellowish shade streak; fringes pale. Secondaries rounded, small, wholly black, with pale fringes. Body blackish, clothed with olivaceous hair. Beneath without markings, pale; on the fore wings a faint indication of the fascia of the upper surface, preceded at the base of the wing, and succeeded subterminally, by dusky scales.

Expanse, 17 m. m. *Habitat,* California (Theo. L. Mead, No. 70).

HELIOTHIS, Ochsenheimer (1816).

Subgenus, *Melicleptria* Hübner[7] (1816).

Type: Noctua cardui, *Esper.*

Heliothis mitis, *Grote,* Plate 3, fig. 7 ♀.

♀.—Ocelli; eyes naked; front bulging, very full; antennae simple, scaled; palpi and body without the very heavy fringing and vestiture of *Heliolonche*. Size small. Fore wings dark, olivaceous yellow, tinted with bright ochreous. A rounded, oblique, pale yellowish transverse exterior fascia, attaining internal margin. The narrow subterminal darker ground shade between this and the broader terminal pale yellowish space is, by contrast, distinct. A narrow terminal linear continued shade of the darker ground color; fringes bright ochreous. A hardly perceptible discal longitudinal paler shade. The ornamentation of the fore wings recalls that of the preceding species. The shape of these is, however, different, the external margin being shorter and the internal angle more determinate. Hind wings black, with pale yellow fringes.

[7] This section seems to me of at least equal value with Dianthoecia, and might be raised to generic rank.

Beneath largely blackish, without marks; the apices and costal region and the fringes of both wings pale yellowish.

Expanse, 18 m. m. A single specimen on flowers in July. Central Alabama. Collection of this Society.

The fore tibiae are provided with a double row of spines, terminating in longer claws; the other tibiae appear to me unarmed.

Heliothis villosus, *Grote.*

Melicleptria villosa, Grote, Proc. Ent. Soc. Phil. p. 531, Plate 6, fig. 6, 1864.

Habitat, Colorado Territory.

Heliothis suetus, *Grote,* Plate 3, fig. 10 ♂.

♂.—Ocelli; eyes naked; antennae simple, scaled above, pilose beneath. Body clothed with pale sericeous olivaceous hair. Fore wings dull purple, equally overlaid with pale sericeous scales. No traces of ordinary lines. Below median nervure, between the inceptions of veins 2 and 3, an even nearly white band descends straightly to internal margin. Above median nervure a whitish discal blotch takes the place of the orbicular and a second broader, at the extremity of the cell, the place of the reniform. These two discal demi-bands seem on either side continuous with the inferior band which hence has a furcate appearance. Terminal space paler than the rest of the wing, wanting the purple color, and indicating, by contrasting, a subterminal line. Hind wings black with a broad median fuscia interrupted medially and thus forming two large spots, the lower subquadrate, the upper ovate; fringes white. Beneath, largely white; costal edge of primaries white; the deep black basal patch not attaining costa; a large subquadrate black discal spot; transverse line indicated and followed by a large diffuse blackish shade inferiorly. Hind wings largely whitish; the black basal patch does not attain costa and partly absorbs the large discal spot. The wide, hind border is abbreviated.

Expanse, 23 m. m. *Habitat,* Colorado Territory (coll. Theo. L. Mead, No. 7).

Resembles the European H. purpurascens, but is more faintly colored and the band of the fore wings is single inferiorly.

Heliothis persimilis, *Grote,* Plate 3, fig. 11 ♀.

♀.—Perhaps the opposite sex or a variety of *H. suetus.* It differs as follows: smaller and with olivaceous scales margining the median fascia

inwardly and obtaining on the cell between the two blotches. A third yellowish-white spot on the cell nearer the base of the wing, at about basal fourth. Hind wings with the spots much smaller than in H. suetus, the upper one notably reduced. A third spot nearer the base of the wing. [This accessory spot may be wanting in other specimens, since it is distinct on one wing, and I can find no trace of it on the opposite side, while my specimen is in perfect condition.] Beneath, much as in H. suetus, but the costal edge is black, and on either pair the black color predominates; the inner white spot of the primaries is very distinct; on the hind wings is a trace of a subterminal line continued above the abbreviated marginal band.

Expanse, 21 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 6).

Heliothis pauxillus, *Grote*, Plate 3, fig. 6 ♂.

♂.—Resembles the preceding two species, but the white bands and spots of the primaries are here wanting, and the normal two median lines are perceivable as paler flexuous lines, the transverse anterior arcuate, the transverse posterior subsinuous. The wing wants all purple tints and is dull sericeous olivaceous, the basal and subterminal spaces darker. Paler shades on the median space indicate the discal spots. Fringes darker-shaded at base. Hind wings black, with two small sub-equal yellowish spots situated rather nearer the base of the wing than usual. Fringes whitish. Beneath, much as in H. persimilis.

Expanse, 19 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 9).

Heliothis proruptus, *Grote.*

Heliothis proruptus, Grote, Trans. Am. Ent. Soc., Vol. IV, 1873.

Habitat, California.

Heliothis spinosae, *Guenée.*——

Heliothis spinosae, Guenée, p. 182, Plate 9, fig. 10, 1852.

Habitat, Canada (auth. Guenée).

Heliothis hirtellus, *Grote and Robinson.*

Anthoecia hirtella, G. & R., Proc. Ent. Soc. Phil., Vol. 6, Plate 3, fig. 3, 1865.

Habitat, Rhode Island.

This may be Guenée's *spinosae*, while the figure in the Spécies Général but distantly recalls our species, and the description does not agree entirely, especially in the color and position of the reniform spot.

Heliothis tuberculum, *Hübner.*——

? Anthoecia tuberculum, Guenée.

Habitat, "Pennsylvania" (auth. Hübner).

Hübner's figure points to a species yet to be discovered by us, while M. Guenée's identification may be inexact, since the hind wings are described as "jaunes" in the Spécies Général.

Heliothis binus.——

Anthoecia bina, Guenée, p. 186, 1852.
Anthoecia bina, Grote, Proc. E. S. Phil., p. 342, 1863.

Habitat, Amérique Septentrionale (auth. Guenée).

Heliothis brevis.

Anthoecia brevis, Grote, Proc. Ent. Soc. Phila., p. 530, plate 6, fig. 4, 1864.

Habitat, Colorado Territory. A specimen from the Territory taken by Theo. L. Mead, and numbered 8, perfectly corresponds with my type, and measures 25 m. m. in expanse.

Heliothis atrites, *Grote.*

Anthoecia brevis, Grote, ♀ var., Proc. E. S. P., p. 530, plate 6, fig. 5, 1864.

I have seen a second specimen in St. Louis, which was larger, while otherwise agreeing with the specimen from Colorado Territory, and I feel little hesitation in retaining it under a distinct name.

Heliothis arciferus.

Anthoecia arcigera, Guenée, vol. 2, p. 184.
Anthoecia arcifera, Guenée, vol. 3, p. 399.
Anthoecia arcifera, Grote, Proc. Ent. Soc. Phila., p. 340, plate 6, fig. 3, 1863.

Habitat, New York; Pennsylvania.

Heliothis Spraguei.

Anthoecia Spraguei, Grote, Proc. Ent. Soc. Phila., p. 341, plate 6, figs. 4 and 5, 1863.

Habitat, New York; Pennsylvania; New Jersey.

This species unites in its coloration the first and second groups of M. Guenée's genus Anthoecia. There seems to be no value to that arrangement, since M. Guenée's *Anthoecia rivulosa* is not related to *A. arcifera*, but to *A. Thoreaui*, G. & R., a species which apparently would have been excluded by M. Guenée from his first group.

Heliothis lynx.

Anthoecia lynx, Guenée, p. 185.

Habitat, Massachusetts to Alabama.

Heliothis Packardi.

Anthoecia Packardii, Grote, Proc. E. S. Phila., p. 528, plate 6, fig. 2, 1864.

Habitat, Colorado Territory.

Heliothis nobilis.

Anthoecia nobilis, Grote, Proc. E. S. P., p. 529, plate 6, fig. 3, 1864.

Habitat, Colorada Territory. Perhaps the same as the foregoing. In the collection before me from the Territory are no specimens of either form, nor of the succeeding two species brought from thence by Mr. Ridings.

Heliothis mortuus.

Anthoecia mortua, Grote, Proc. E. S. P., p. 528, plate 6, fig. 1, 1864.

Habitat, Colorado Territory.

Heliothis jaguarinus.

Anthoecia jaguarina, Guenée, vol. 2, p. 184, plate 9, fig. 11, 1852.
Anthoecia jaguarina, Grote, Proc. Ent. Soc. Phila., p. 528, 1864.

Habitat, Colorado Territory (coll. Ridings).

Subgenus *Tamila*, Guenée (1852).

Type: Noctua nundina, *Drury*.

Heliothis nundinus.

Noctua nundina, Drury.

Habitat, New York; Pennsylvania; New Jersey.

Heliothis Meadi, *Grote*, Plate 3, fig. 5.

♂.—Fore wings bright olivaceous green, with silvery white transverse lines; basal half-line silvery white; transverse anterior line rather broad, silvery, forming a single arcuation, interrupted about median nervure by two minute black streaks; a similar interruption marks the transverse posterior line below median nervure; transverse posterior line silvery, forming two inward arcuations, the first to vein 5, the second to internal margin immediately on which the line straightens; median space with a pale diffuse shade inferiorly preceding the t. p. line below the nervure; medially, on the cell, is a pale spot which extends superiorly along costal region to the t. p. line; the bright olivaceous green subterminal space extends opposite the cell to the terminal margin, dividing the pale terminal space; the subterminal line is only indicated by the contrast between the bright subterminal and the pale creamy yellowish terminal space; fringes pale, cut with olivaceous green; hind wings whitish, with a broad, black marginal band, half interrupted as usual on the margin before anal angle, and a broad discal lunule fused with blackish basal scales; fringes white; beneath creamy white; the primaries show an inferior basal black dash, two discal spots, the outer the larger, and a diffuse black inferior shade without the transverse line; hind wings show a blackish discal lunule and an abbreviated marginal band at anal angle; thorax and abdomen creamy whitish, paler beneath.

Expanse, 26 m. m. *Habitat*, Colorado Territory (coll. Theo. L. Mead, No. 5).

This is the most beautiful species perhaps of the genus, and it gives me pleasure to dedicate it to Mr. Mead, to whose kindness I owe an opportunity for examining a rich collection of Noctuidae from Colorado Territory, The present species differs throughout from H. nundinus, to which its resemblance is only general, so that a comparative description would be superfluous.

Subgenus *Heliothis*, Ochsenheimer.

Type: Noctua armigera, *Hübner*.

Heliothis citrinellus, *Grote and Robinson.*

Heliothis citrinellus, Grote & Rob., Trans. Am. Ent. Soc., vol. 3, p. 180, plate 2, fig. 79, 1870.

Habitat, Texas.

Heliothis phlogophagus, *Grote and Robinson.*

Habitat, Western States; Colorado Territory (coll. Theo. L. Mead, Number 23); California. This species is sometimes confounded with H. armigera. In a late number of the American Naturalist (April, 1873) it is figured on p. 214, with an erroneous determination. On the same page, fig. 40 is considered to represent Anomis xylina, which it does not. These errors impair the value of the article which the figures illustrate.

Heliothis armigera, *Hübner.*

Heliothis umbrosus, Grote, Proc. Ent. Soc. Phila., Vol. 1, p. 219, 1862.

This is the "Boll-worm" of agricultural writers, and is more or less destructive to the cotton boll in the Southern States, where it is widely distributed. It is there often erroneously considered as the same as Anomis xylina, which is the true "Cotton worm," feeds on the leaf, occurs in swarms at varying periods, and belongs structurally to a lower group of the family. I consider Anomis xylina as an introduction, and not as a true habitant of the Cotton belt. From the irregularity of its appearance, its defective economy (brought about by feeding on an annual, whereas in the countries of which it is a native, the cotton plant lasts several years), and the circumstantial evidence offered by its progression northward, de novo, every year that it occurs within our limits, I conclude that its introduction is due to secondary causes. It is killed out every winter with the destruction of the plant by the frost in central Alabama, Georgia and the Carolinas. The last act of the successive generations is often to fly out of the loosely webbed and defenseless

pupa into the face of the frost. On warm winter days the moths may be disturbed in shelter. Since cotton is planted after the spring vegetation has appeared, and no worm troubles the early plants, it is evident that Anomis xylina does not exist at that time in any stage. For if it existed as a moth, it would perish before the plant was up upon which to deposit; if as an egg, this would hatch equally before the food was ready; if as a chrysalis, it could not lie exceptionally dormant while kindred life was active, unless in all these cases it suited itself to the altered economy of its food plant. I have never found it in any stage in the Cotton belt in the early spring. The rapid numerical increase of individuals in the native broods may be owing to the absence of parasitic checks which have been escaped in migrating, and left behind in more Southern countries. On the other hand, Heliothis armigera is a resident of the United States. While a comparison of American specimens (*umbrosus*) with European individuals (*armigera*) affords me no apparently valid distinguishing characters, I yet remark that the larvae have not been compared. I am not yet prepared to believe that the species has been introduced from Europe, feeding, as it does here, on some peculiarly American genera of plants. Yet, according to Guenée, its habitat is very extended, since it has been taken in Australia, where, however, it may have been introduced since the colonization and from America. It occurs apparently rarely in Europe, whereas it is here common. Has it reached Europe by a westward route from California? We shall probably soon write after its habitat—the world.

HELIOCHILUS, Grote (1865).

Heliochilus paradoxus, *Grote.*

The aberrant neuration distinguishes this genus, originally described from Colorado Territory. I have taken the species in Central Alabama, apparently only differing from my types by its smaller size. I learn that the genus has been since discovered in Northern Hindostan.

CHARICLEA, Kirby.

Chariclea exprimens.

Heliothis exprimens, Walker.

Represents in the Atlantic District the European Chariclea umbra, *Lederer* (*Heliothis marginata*, Auct.).

Argillophora,[8] n. g.

Ocelli. Antennae simple, scaled, pubescent in both sexes. Labial palpi porrected, curved, coarsely scaled, held apart from, but not exceeding, the front, divaricate. Wings rather wide and subangulate. Fore wings roundedly produced opposite median nervules, below which the external margin is cut inwardly to internal angle. Hind wings with rather determinate apices, full about median nervules and a little inwardly cut before anal angle. Primaries 12-veined; 3, 4, 5, near together, 5 near 4, joined by a portion of the cross vein which is discontinued, leaving the cell open. An accessory cell from the middle of the lower margin of which 6 is angulatedly thrown off opposite 5; 7 and 8 arise together from the outer point of the cell; 9 out of 8 to costa just before apex; 10 out of the upper margin of the cell near its apex to costa; 11 out of subcostal nervure opposite 2; 12 a simple nervure to costa near 11. Hind wings with two internal veins, 1 and 1*a*; 3 and 4 from one point; 5 removed, springing from the cross vein which beyond its inception, arcuatedly closes the cell; 6 and 7 from one point, together; 8 from the nervure at a point within the inception of 2. Hind tibiae with double spurs. Body linear; abdomen exceeding the secondaries, with very minute dorsal tufts.

The color is yellowish buff, wings nearly alike, primaries with a white angulate fascia, so that we are reminded of Leucania. But in the arcuate palpi, the wide wings, their shape and the neuration, we see that we have to do with a form allied to Spargaloma, and belonging to a very different group of the family.

Argillophora furcilla, *Grote.*

♂ ♀.—Dull creamy buff, shaded with blackish obliquely downwards from the apex inwardly, and longitudinally from the base outwardly over the median space. A black dot at base, one at the locality for the orbicular, and one (sometimes wanting) at the extremity of the cell, all parallel. A prominent

[8] Gr.: ἀργιλλος et φέρω.

silvery white elbowed band, limited by black scales more or less evidently, commences at the base of the wing below median nervure, and runs outwardly a little obliquely and downwardly, not attaining the internal margin, to a point beneath the second black dot, whence it ascends obliquely outwardly to the extremity of the discal cell, there widening and terminating, but sending beyond its termination on either side a continuing streak, the outer the longer, limiting inwardly the oblique, dusky, apical shade. Thus the termination of the white fascia is more or less furcate in appearance. A terminal series of black dots; fringes darker than the wing. Hind wings in the male more yellowish and clear, without shades or markings, in the female more or less smoky, in either sex with a terminal broken black line. Beneath the primaries show a blackish oblique apical shade and a single transverse line, projected opposite the cell and more evident superiorly. Hind wings faintly irrorate, with a minute discal dot and a subterminal atomical line running straightly across the wing, not coinciding with external margin and sharply angulate at about vein 6, thence running back to costa. In the female there is a blackish cloud at apex which conceals the angulation of the line, the course of which is peculiar to the group to which this form belongs. Body concolorous with wings; thorax above minutely irrorate with black scales, and these black scales also obtain over the surface of primaries at base. The few dorsal dots along the abdomen seem raised and appear as incomplete tufts.

Expanse, 24 m. m. *Habitat*, Central Alabama in July.

Harveya, n. g.

Eyes naked, ocelli; caputal squamation short and thick; labial palpi free, exceeding the front; third joint half the length of the second, closely scaled; ♂ antennae with a rather long cilial fringe across the joints beneath, converging at the sides; tarsi spinose; legs strong, closely scaled, strongly spurred. Body stout, smoothly and thickly scaled, in general form like *Panopoda;* abdomen not exceeding anal angle of secondaries, comparatively stout and thick, pointed at anus. Wings broad, densely squamose; primaries with the costa arcuate to the apices which are squarely cut, the external margin descending at right angles, 12 veined, 3, 4, 5 near together, 5 half the distance from 4 that separates 3 from 4, cell closed centrally by a fold, 6 opposite 5 from the cross-vein as near the lower angle of the accessory cell as 5 from 4, 7 and 8 together from the apex of accessory cell, 7 to apex, 9 out of 8 a very short furcation to costa; cell double, divided obliquely centrally by a vein which seems the prolongation of 10, upper side of the cell formed by 11, which anastomoses with 10, beyond which the two veins are thrown off near together to costa. Hind wings rounded, 8-veined, two internal veins (1 and 1*a*), cell open, or closed by an incomplete fold, 3 and 4 together, 5 a little re-

moved, costal and subcostal veins anastomosing at base. The fringes are short; internal margin lengthily haired; alar squamation dense. The species is broad-winged, stout, allied to Panopoda, *Guenée*, and Pleonectyptera, *Grote*. The whole insect is dyed of a pale vermillion, darker, shaded with yellowish above, and in its bright colors recalls both Pleonectyptera and the Geometridae; the usual lines and spots are absent. It has something of the compact appearance of Pseudophia.

I name the genus after Dr. Leon F. Harvey, Secretary of this Society, whose devotion to science and personal amiability merit the only recognition it is in my power to bestow.

Harveya auripennis, *Grote.*

♂.—The whole insect is pale vermillion with an orange cast, shaded above with dead buff or yellowish. The lines are obsolete on the fore wings above. The transverse anterior line is merely indicated by two or three geminate, white and black scale points. The transverse posterior line is pale, even, nearly perpendicular, angulated opposite the cell, thence running inwardly obliquely to internal margin; it is marked by black and white scale points on the veins; the line appears as a narrow yellowish thread-like shade, removed towards the external margin. The reniform is sometimes perceptible as a vague yellowish mark, tolerably large and of the usual shape. Outside of this runs the powdery black median shade, the most prominent marking of the wing, sometimes obsolete superiorly, and appearing as a powdery black spot on internal margin, near the base of the t. p. line. A series of interspaceal subterminal black streaklets followed by white points sometimes faded out. There is a pale faint pruinose shade over the wing subterminally, which spreads over the concolorous hind wings, these latter show no other marks save a vague continuation of the markings of the t. p. line. Beneath, body and wings brighter than above, without markings, though a faint common line is indicated. Terminal joint of palpi with blackish scales; tarsi blackish; legs white dotted at the knees and base of the joints.

Expanse 45 m. m. *Habitat*, Florida (Charles Linden legit); Kentucky (Mr. Theo. L. Mead, No. 149).

Spiloloma,[9] n. g.

Ocelli. Eyes naked, without lashes. Front without projection. Middle tibiae sparsely spinose; fore and hind tibiae without spines; all the tarsi-spinose. Vein 5 of the hind wings equally strong, arising very near 4.

[9] Gr.; *σπιλος* et *λῶμα.*

Abdomen without tufts. Labial palpi well developed, hardly exceeding the vertex, thickly scaled; third joint proportionally long. External margin of the wings waved. Legs closely scaled; fore tibiae shortened and with a swelling, more thickly haired. Antennae scaled above, thickly ciliate beneath, with a lateral longer bristle on the sides of each joint. Wings wide; size rather large; body proportionally slender. Squamation smooth and flattened, without tufts; between the antennae the scales have a forward direction without forming a prominent interantennal tuft. Head proportionally large. Collar discolorous, somewhat wide; thorax square in front, rather heavy; abdomen proportionally slender, tapering, fully as long as the hind wings.

Differs from Leucanitis in the middle tibiae being alone spinose; from Catocala in the waved margin, smooth vestiture, and concolorous wings; from Pseudophia by the non-spinose hind tibiae; from Harveya by the spinose middle tibiae, less thickly scaled middle and hind legs, broader wings with waved external margins, stouter palpi and slenderer shape. The ornamentation recalls Megachyta lituralis, and certain of the Geometridae.

Spiloloma lunilinea, *Grote.*

♂.—Pale brownish dove color. Collar darker; body concolorous. Fore wings with obsolete ornamentation. Costal edge with four distinct deep brown liturate spots marking the inception of the extra-basal, transverse anterior, median shade and transverse posterior lines. Below these the transverse lines are merely indicated by minute nervular dots. The median shade is very faint, linear, somewhat ochreous. The ordinary spots are obsolete. Subterminal line faintly indicated, marked on costa and preceded by two costal marks. A darker shade over the median nervules on terminal space. Hind wings concolorous, with the t. p. line continuous and formed by minute nervular dots, and the pale subterminal, faintly indicated. Beneath, without markings, except a quite distinct continued dark narrow extra-mesial common lunulated line drawn across both wings, and accentuated on costal region of primaries. A faint discal shade spot on the hind wings.

Expanse, 50 m. m. *Habitat,* West Virginia (coll. Theo. L. Mead, No. 148).

Our actual knowledge of our Moths, and more especially the Noctuidae, is yet too indifferent and our collections too meagre, to allow us to draw any stable conclusions with regard to their geographical distribution. While certain species occur from California

to Maine and southward to Texas, as for instance Heliothis armigera, and certainly show little or no local variation, it is possible that others, now separated by us specifically, may be hereafter united as geographical races. The important work of Allen on our Birds, shows us the value of minute comparisons over wide areas. But we are very far from possessing the basis for such intelligent comparisons in the Moths. Our material must first be named and the differences, such as we find them, exhibited, before we can properly estimate the value of the distinctions we perhaps may at first overweigh.

To the few intelligible figures of the older illustrators and the Spécies Général of M. Guenée, we have now to add the conscientious labors of Lederer on the Pyralidae, and of Zeller on Texan Moths, increasing the number of observations written in Europe on our Moths, which are of permanent value. On the other hand the otherwise great labor displayed in the compilation of the British Museum Catalogue has been thrown away by the careless and incomplete descriptions it embodies, and it will remain a constant obstacle to a correct synonymy if we continue to recognise it as an authority. By its non-correction we are brought to face a dilemma by which we must either commit an act of violence and reject the Catalogue totally, or submit to the study of a repulsive compilation from whence we cannot derive either correct information or certainty on any one point and expose our lists to endless and irritating changes at the dictum of the British Museum. While the first course is openly advocated by many European scientists, who are in reality less interested in the matter than ourselves, I, for one, must prefer the latter alternative, as I elect to suffer through an injustice rather than to countenance an apparent wrong.

VIII. Descriptions of Noctuidae principally from California

BY AUG. R. GROTE.

(*Read before this Society, August* 1, 1873.)

I owe to the kindness of Professor A. S. Packard, Jr., of the Peabody Academy of Science, Salem, Mass., a collection of Moths from California and the Territory of Nevada, for study and identification. The collections had been sent by Mr. Hy. Edwards and Mr. James Behrens, to whom credit is given in the present Paper. From the condition of some of the specimens and the necessity of having a larger material for examination, I have not been able to catalogue the entire collection at the present writing, and hope to be able to turn again to the subject on receiving the necessary material.

I have included in this Paper notes on certain species received from other correspondents to whom I am indebted for the favor.

Habrosyne scripta (*Gosse*).

Habitat, Sitka (coll. Mr. Hy. Edwards, No. 137).

The specimen (in poor condition) does not seem to differ from our Eastern material. The species is very near the European H. derasa. This genus and Thyatira have a singular distribution. Habrosyne has one European species, *derasa;* one Asiatic, *gloriosa;* one North American, *scripta.* Thyatira is credited with one European, *Batis;* one Asiatic, *vicina;* one North American species, *pudens.* The specific differences in each genus are slight, and are perhaps due to the effects of climate, since our N. A. species of either genus are brighter colored than the European. I remark, however, that the larval forms of our species are unknown. Again

it must be remembered that the species are all Arctogaeal. While both genera are Bombyciform Noctuidae, it seems natural that they should favor high latitudes, and H. scripta may be spreading southwards on this continent. We have it from Virginia, but I have already remarked that the lepidopterous fauna of the Southern States is not divisible from the Middle States, until, perhaps, we come to the Floridian peninsula and Southern Texas. Hence I would attach little value to descriptions of species principally based on Southern localities, e. g., *Grapta Crameri*, Scudder. I have the Floridian Harveya auripennis, also from Kentucky; this seems to me a Southern form spreading northwards, since the group to which it belongs is more extensively developed as we progress towards the equator.

Acronycta lepusculina, *Guenée.*

Habitat, California (Mr. Hy. Edwards, No. 72).

Two specimens are before me which are better marked beneath than usual, but which belong evidently to this species. This must not be confounded with A. lupini, *Behr.* A study of this genus shows that the specific names retained under it represent very unequal values. Thus, Acronycta occidentalis, *Grote*, designates a form which differs exceedingly slightly in the imago state from another, Acronycta psi, while the two species differ very strongly as larvae or in the young stage. Again, Acronycta lobeliae, *Guenée*, represents a form that, comparatively speaking, cannot be mistaken in any stage, as far as known. Yet where we find a difference we are obliged to signalize it, the rather if we are amenable to the evidences offered by the theory of evolution of species through constantly acting natural laws. Where, as in Acronycta, there is a prevailing general uniformity in the appearance of the imagos of a single group of species, and generally broad distinctions between the larval forms, it is a not unreasonable conclusion that these larval differences are gradually evolved by the workings of a natural protective law which intensifies their characters in the direction in which they are serviceable to the continuance of the animal.

Understanding metamorphosis in insects as correlated with development, and as a growth-period characterizing a more sudden

escape from a lower and more embryonic physical condition, we may consider it as a reminiscent action, marking the successive developmental halts in the kingdom, through which it is given to some to pass, and at which it is fated that others shall perish.

Within the two series of suborders of Hexapoda, a synthetic type has been shown by Packard to exist in the Neuroptera. In comparing the Lepidoptera, a synthesis may be detected in the Bombycidae. Thus the Lithosiinae resemble the Pyralidae, the Arctiinae the Noctuidae, the Attacinae the Geometridae; lower down the Cossinae the Tineidae, though the actual interchange of the two latter must be doubted, even since the discovery of such a form as Morpheis, perhaps the most extraordinary form of the suborder. Professor Packard has compared the thoracic structure of Sthenopis with the Neuropterous Polystichoetes. And, in a general comparison with the Neuroptera, the Lepidoptera are seen to advance along a line of parallel development. Indeed the development of all the suborders is at least biserial, reflecting the progress of the Order. Thus the Diurnals resemble the higher Neuroptera in the position of the wings, while in the lower Neuroptera these are deflexed as in the Moths. In considering the general progression of the Hexapoda, the Devonian and earliest forms known seem to be Neuropterous, nor is there yet sufficient evidence to prove that the common origin of Hexapoda is to be carried back through suborders exclusively fossil. Yet that the position of the Neuroptera suggests such a third series, which is now no longer living, and which has given rise to the Orthoptera, Hemiptera and Coleoptera, and again to the Diptera, Lepidoptera and Hymenoptera, cannot be denied. And that the Lepidoptera are the more recent, palaeontological evidence rather confirms, while we should not expect the Butterflies to be largely represented among the flowerless forests of the Carboniferous period. On general grounds we shall agree that the common origin of Tracheata is to be sought in the Zoëaeform Crustacea as suggested by Haeckel. Packard's objection, that Leptus begins life on a higher level than Nauplius can hardly lead us to reject the crustacean origin of Hexapoda, a type which must have been evolved from a littoral biregional ancestry. In studying the larval forms of Hexapoda we follow Packard's exposition of larval types. The exceptional position of the abdomen in the young Lachnosterna recalls the usual

Saw-fly form, while the larvae of the Lepidoptera more generally resemble the young stages of the higher Bees. Hitherto recorded observations suggest that the higher Tracheata have been evolved by an effort of adaptation to a land life. The land was probably visited at first irregularly and then at a stated life-period, while the Hexapodous type affords an ascending series of grade in terrestrial adaptation. The consideration of the general longer period of larval life shows a connection with this effort, while the greater equalization in duration of the periods of growth, or the curtailment of the younger stage to the benefit of the adult, marks a permanent advance in type in Hexapoda.

In examining the general characters offered by the Lepidoptera, attention has been already directed by Agassiz to the position of the wings. The elevation of both pair in the Papilionidae necessitates a single muscular action in the act of assuming flight. In the Moths the primaries being deflexed and the hind wings doubled upon themselves, an additional muscular movement is required and, as I have assured myself, the wings are first independently thrown forward. That the stronger-hued Diurnals are in all probability more recent in time than the Moths, must be, in default of palaeontological evidence, as yet mere surmise; yet Castnia suggests the forms through which the Bombycidous type may have passed.

The antennae of the Lepidoptera have early enlisted the attention of classificators, but I find on reflection a renewed objection to Boisduval's terms in the physical unimportance of the difference they signalize. On comparing the antennae of the Moths and Butterflies together, we should be rather struck by their rigidity and uniform length in the latter group. The flexibility and diversity of the appendages to the joints of the antennal stem in the Moths, point to a more active use. From the stout, rayed and short antennae of Attacus, to the thread-like, simple and lengthy antennae of Adela, there is a wide diversity, indicative of utilitarian change. When we remember the general habit of the Moths, the necessity for a development of their perceptive faculties, independent of vision, seems obvious; their more sensitive antennae may protect them from many enemies their habit exposes them to. On the other hand the Butterflies are more

protected by vision, and the rigidity, together with the general uniformity of the antennae, seems to be the result of desuetude. Clemens' experiment in the excision of the antennae of Platysamia cecropia, points to a different conclusion from that reached by him, viz.: that the antennae are instruments of atmospheric palpation. The power of hovering was hardly lost through antennal mutilation, but suspended through the consequent loss of a heavy percentage of the perceptive faculties. On occasion I have noticed that the loss of the antennae in the Butterflies has not been attended by an equivalent result. Finally it does not seem reasonable to expect a complete differentiation of the senses in the Articulata.

Admetovis, n. g.

Ocelli. Eyes hairy. Front full, closely scaled, exceeded by the roughly scaled labial palpi. Antennae shorter in the male, each joint provided with rather stout corneous lateral pectinations, giving off at the extremity a stouter bristle, and more finely bristled beneath; in the female longer and simple. The tibiae are unarmed; legs stout and long. The body is long, stout and fusiform, thorax elevated, rather short, crested behind; abdomen long and stout, exceeding the secondaries by nearly a third of its length. In the female the stout ovipositor is notably extruded. The maxillae are moderately stout. The wings are long, with very straight costal margin of primaries, rather acute apices and oblique, but little rounded, hind margin.

Apparently the nearest European ally to our genus is Brithys, from which Admetovis differs decidedly in the shape of the wings, the extruded ♀ ovipositor, the sexual difference in the antennal length, and stouter maxillae.

Admetovis oxymorus, *Grote,* Plate 4, fig. 5, ♀.

♀.—Bright gray. Median lines perpendicular, accompanied by paler shades, approximate, irregular, transverse posterior more regularly scalloped. Orbicular rather large, subquadrate, double-ringed, concolorous. Reniform whitish with a brown internal annulus, claviform indistinct. Subterminal space pale, washed with a delicate brown, deepening in color to the strongly expressed subterminal line which is the most prominent feature of the wing. The line appears to arise on the external margin at vein 8 below the apices, whence it runs inwardly, meeting the margin again at the extremity of vein 4; here it runs inwardly again, shortly dentate on vein 3, forming a wide scallop and

joining the internal margin midway between the angle and the base of the transverse posterior line. It is of an intense deep brown with a thread-like white outer border. The gray terminal space is thus divided by it into unequal portions. An interrupted black terminal line; the gray fringes are a little produced at the extremity of the nervules. Hind wings obscure ochrey white, with a light brownish diffuse exterior shade; the nervules incompletely marked with dark scales and a subcontinuous marginal black line; fringes whitish with an internal dark line. Tegulae gray, contrasting with the light brown collar and thoracic disc and tuft; abdomen colored like the secondaries. Beneath the wings are pale, shaded with reddish over the apices and costal margins, sparsely dusted with dark scales, with a common exterior line emphasized on the veins and faint discal dots more apparent on the hind wings; a faint subterminal line appears contrasted by the difference in tone of the subterminal and terminal shades.

Expanse, 46 m. m. *Length of body*, 24 m. m. (including ovipositor). *Habitat*, California, Sierra Nevada (coll. Mr. Hy. Edwards, No. 2733).

♂.—At first sight, and with a different locality, the specimen I regard as belonging to this species, would not be considered as referable to it. The thorax and fore wings are uniformly gray sprinkled with darker scales. The reniform is concolorous and both spots relatively larger. The most prominent difference is expressed by the absence of the contrasting light and brown color of the subterminal space, which is here concolorous. The subterminal line is, however, here brown, distinct, and in its general course the same as in the opposite sex; it forms a more evident W-shaped mark by its dentations on veins 4 and 3; it runs backward above vein 8 to costa, leaving the apices gray; however a faint trace of this action is visible in the female, in which the apices are concolorous and apparently fused with the subterminal space. The hind wings are more whitish with a more determinate darker band and beneath the specimen lacks the reddish shade of the female, with an otherwise similar appearance of the wings.

Expanse, 46 m. m. *Length of body*, 22 m. m. *Habitat*, Colorado Territory (coll. Mr. Theo. L. Mead, No. 54, $^{13}/_{7}$).

Agrotis Vancouverensis, *Grote*, Plate 4, fig. 4, ♂.

♂.—Light brown with pale shadings. A very broad distinct basal dash, widening outwardly, extends into the median space, apparently concealing the claviform. T. a. line strongly dentate inferiorly. Discal spots set in the black

filling of the cell. Transvere posterior line unusually sharply denticulate; the pale subterminal line preceded by large cuneiform brown marks. An interrupted black terminal line on the margin; fringes light brown. Hind wings fuscous without markings, save from the reflection of the black and distinct discal liture of the under-surface; fringes as on primaries. Beneath fuscous without markings except the discal spots, which are unusually broad on the secondaries. Thorax above brown with darker lines on the collar.

Expanse, 40 m. m. *Habitat*, Vancouver's Island (coll. Mr. Hy. Edwards, No. 2624).

A rather large, broad-winged species, allied to A. obeliscoides and A. venerabilis, differing by the dentate and distinct transverse posterior line.

Agrotis saucia (*Hübner*).

Habitat, California (coll. Mr. Hy. Edwards, No. 157). The American specimens, described by Harris as *Agrotis inermis*, are not distinguished. In the same way Harris describes our specimens determined by Guenée as Agrotis suffusa, under the name of *Agrotis telifera*.

Agrotis Wilsoni, *Grote*, Plate 4, fig. 3, ♂.

♂.—Hind and middle tibiae spinose. Eyes naked. Antennae bristled, the joints with lateral fascicles. Fore wings singular in appearance, as if overlaid from the base to the terminal space with a smooth olivaceous-ochrey shade, in which the distinct, black, pale-circled, attenuate ordinary spots appear as if cut out. At the base of the wing are some blackish marks indicating the basal half-line. On costa there is a darker somewhat ferruginous shade preceding the inception of the subterminal line, which is inwardly dentate opposite the cell and may appear by contrast against the blackish terminal space. No or very faint traces of the ordinary lines. Terminal line a series of very distinct black linear marks. Secondaries fuscous, a little paler basally, with whitish faintly interlined fringes. Beneath very pale, without lines, but with the reniform on the primaries distinctly reproduced and a black discal comma mark on the hind wings. Thorax with ferruginous shades on the collar and centrally; abdomen pale ochreous with the anal hairs reddish.

Expanse, 37 m. m. *Habitat*, California (Mr. James Behrens, No. 12). I know of no species resembling this in ornamentation. I respectfully dedicate the species to Mr. Walter T. Wilson, whose services to Natural Science deserve to be held in remembrance.

Ammoconia badicollis, *Grote,* Plate 4, fig. 18, ♀.

♀.—Eyes naked, strongly lashed. Middle and hind tibiae spinose. Abdomen narrow, without tufts, anal segment laterally compressed. Thorax with a slight tuft behind the collar, the latter medially produced. Gray, powdered with brown, with a warm tint which becomes reddish on the under-surface of the wings. Primaries with the ordinary lines partially effaced. The inceptions of the basal, transverse anterior and transverse posterior lines are marked with blackish brown on costa; between the first two the costal region is free from brown scales. T. a. line skirting the large, concolorous, decumbent orbicular, beneath which it is very fine, arcuate outwardly on submedian interspace, running inwardly on vein 1, again outwardly projected to internal margin. A short brown shade on the cell connects the transverse vaguely-outlined reniform, which is hardly as large as the orbicular. T. p. line geminate, consisting of a pale included space margined inwardly by an obsolete line, and marked outwardly by black and white nervular dots obsolete superiorly. Subterminal line whitish, more or less fragmentary and irregular, preceded by a brown shade. A terminal lunulated deep brown line corresponding to the slightly waved external margin. Hind wings pale fuscous, with pale fringes and depressed external margin opposite the cell. Beneath, the wings are reddish along costal and external margins, show rather distinct linear discal marks and a common exterior transverse blackish line. Body parts beneath tinged with reddish, legs brownish. Palpi prominent, brown at the sides. Collar contrasting, clear pale leather brown, with a distinct superior black line.

Expanse, 38 m. m. *Habitat,* Albany, N. Y. (Mr. J. A. Lintner, No. 2558).

Pleonectopoda,[1] n. g.

Eyes naked, with lashes. All the tibiae spinose; anterior pair with a longer lateral spinule at the extremity of the joint, at the termination of each row of spinules. Head thickly haired and thus concealing a flattened clypeal protuberance. Tongue strong, corneous. Male antennae with the edges of the antennal joints projected, bristled in lateral tufts. Size moderate, ornamentation Agrotiform.

The single species differs from Agrotis by the lashes of the eyes and from Cladocera by the corneous tongue. In the tibial armature the genus resembles Mamestra E *b*. The vestiture of the head and thorax is hairy and thick; behind the centrally projected collar a mesial crest of elevated hair traverses the thoracic disc.

[1] Gr.: *βλεονεχτῶ* et *ποῦς.*

Pleonectopoda Lewisi, *Grote,* Plate 4, fig. 10, ♂.

♂.—Reddish purple brown, not unlike *Agrotis plecta* or *leucostigma* in general color, but more robust and without the pale longitudinal shades on primaries. Transverse lines obliterate. Median lines dark, narrow, faint; t. p. line sublunulate, projected opposite the cell, running evenly to internal margin. Ordinary spots large, concolorous, with a narrow pale powdery edging, separated by a black well-defined shade which fills up the cell and is slightly apparent before the orbicular. Median shade apparent below the orbicular and approximate to the t. p. line. Subterminal line pale. Terminal space duller, paler, less red than the rest of the wing; no terminal line, fringes concolorous. Hind wings pale testaceous fuscous, silky, without marks above or below. Head and thorax reddish; feet pale dotted; abdomen a little darker than secondaries. Costal edge of primaries with anteapical pale dots, visible on the red-stained costal edge beneath. The fore wings beneath are like secondaries, without marks.

Expanse, 34 m. m. *Habitat,* Colorado Territory (No. 31, coll. Theo. L. Mead).

Named in memory of Joseph S. Lewis, late of this Society, a student of Entomology, who perished untimely by the railroad accident at Angola on the 18th day of December, 1867, at the age of 24 years.

Eupsephopaectes, n. g.

Eyes hairy, without lashes; antennae (♀) of the usual length, scaled above, pilose beneath, with two short stout bristles to each joint; front closely scaled, without prominence, rather narrow; tongue long and corneous; legs unarmed; thorax subquadrate with a slight anterior and more prominent posterior crest; abdomen with a dorsal ridge but (♀) untufted. Head prominent; the caputal squamation is massed between the antennae, front untufted. Palpi prominent, exceeding the front, directed obliquely forwards, closely scaled. Wings elongate and rather narrow; primaries widening outwardly, with straight costal edge; apices very slightly blunted; external margin short, evenly rounded; internal margin subsinuate. Hind wings moderate, exceeded by the abdomen. The fringes and the external margins of both wings lightly scalloped. Ornamentation Hadena-like; mimicking the Sphingid genus Dupo.

The genus differs at once from all the genera allied to Hadena (with which I would associate it), such as Prodenia, Brotolomia, Phlogophora, Euplexia, Jaspidea, by its distinctly hairy eyes. From

Mamestra by the sinuate internal margin of the primaries and the more produced apices. The moth is extraordinary for the resemblance which its primaries present to those of Dupo vitis or D. Linnei. The resemblance to Prodenia is therefore also strong.

Eupsephopaectes procinctus, *Grote,* Plate 4, fig. 6.

♀.—The dark greenish-black ground-color of the primaries has a light purple cast along costa and over the narrow defined external margin. The bands and lines are pale brownish-ochrey. The median nervure and veins 3 and 4 are striped with pale ochreous scales to subterminal line. The transverse anterior line is angulated, geminate and margins obliquely outwardly, below median nervure, a triangulate basal patch of the ground color, the inner pale margin of which is furnished by a purplish shade extending obliquely upwardly from the base of the wing, while a pale streak above internal margin provides the base of the triangle. The ordinary spots are opposedly oblique, pale and double-ringed, and hence enclose a V-shaped dark space of the ground color on the cell. A broad pale ochrey band runs downwardly obliquely from the apices to vein 1, which it joins at the extremity of the transverse anterior line. The pale single transverse posterior line accompanies this band from vein 5 downwards, it is dentate on 5 and, above it, runs inwardly upwardly to costa, which it joins above the reniform. The subterminal line appears below the oblique apical band as a series of pale interspaceal streaks followed by dark dots of the ground color of the wing before the purplish contrasting terminal space, which latter shows double terminal hair-lines; fringes pale. Internal margin striped with ochrey brown. Secondaries fuscous, whitish towards base and centrally; veins dark; fringes pale, white-tipped, with a middle dark line. Beneath, with reddish powderings; on secondaries a discal dot. Tegulae pale ochrey, with dark marginal lines. Collar with several alternate pale and dark hair-lines, neatly marked.

Expanse, 45 m. m. *Habitat,* California (coll. Mr. Hy. Edwards, No. 73).

Mamestra chartaria, *Grote,* Plate 4, fig. 12, ♂.

♂ ♀.—Eyes hairy; fore tibiae unarmed; the species belongs to Lederer's section E *c*, and resembles in color, size and appearance *M. albifusa* and *M. chenopodii.* Gray, shaded with olivaceous testaceous, all the markings distinct and colors clear. Basal half-line geminate, black, distinctly marked (as are all the other lines) on costa, with included white scales. T. a. line similar in appearance, the inner line, below the costa, less distinct. Claviform blunt and rounded, dark-shaded. Orbicular rather large, pale and sometimes undefined.

Reniform exceedingly large and characteristic; it is filled in *inferiorly*, over the inception of the m. nervules, by a blackish blotch. Median shade approximate to the reniform, a blackish streak well marked on costa, but below the reniform appearing as an inwardly slightly oblique lunulated line. T. p. line like the other lines, sinuous, not much exserted, lunulate with white included scales. Two white costal dots before the subterminal, on a darker costal shade which precedes the subterminal line on costal region to vein 7. Subterminal similar to the other lines, without a very prominent W-mark; the narrow terminal space is dark and appears as a prominent spot opposite the cell; a dentate terminal line; fringes cut with dark scales as in allied species. Hind wings paler in the ♂, with a line and diffuse darker border in either sex; fringes whitish. Beneath pale, with a very distinct dark common line, accented on the veins, and diffuse subterminal darker shades; discal litures more or less evident. The abdomen is not crested, except incompletely at base, terminates squarely in either sex, and without any external appearance of the oviduct in the female. Male antennae ciliate beneath, impectinate, scaled. Thorax colored like fore wings with blackish lines on collar and margining the tegulae.

Expanse, 34 to 36 m. m. *Habitat*, California (colls. Mr. James Behrens, Nos. 6 and 15, and Mr. Henry Edwards, No. 173). Less glaucous than the European *M. sodae*, H.-S., figs. 66–67, and differing in the details of the ornamentation.

Mamestra cuneata, *Grote*, Plate 4, fig. 9, ♀.

♂ ♀.—Eyes hairy; fore tibiae unarmed, size small, abdomen dorsally with small tufts which are more regular in the female; the species belongs structurally to the same group as *M. latex*. Wood-brown with ashen shades, a black basal streak supporting the half-line. The median lines are geminate with included pale ashen shades, and approach each other on the submedian interspace above vein 1, where the claviform, concolorous with the dark median space, nearly approaches the t. p. line. Ordinary spots similar in appearance, pale ashen, obovate. The t. p. line is succeeded by pale nervular dots. The subterminal space becomes paler before the subterminal line and, on the submedian fold, at the inward angulation of the pale s. t. line, there is a distinct deep yellow (ever *green?*) cuneiform mark. The W-mark is obsolete; terminal space dark, concolorous with median. A terminal whitish dentated hair-line, the dentations alternating with black lines, and preceded by black points. Secondaries dark fuscous with paler interlined fringes. Beneath fuscous with warmer costal tints and faint common line. Thorax lined; tegulae more or less conspicuously whitish.

Expanse, 30 to 32 m. m. *Habitat*, California (coll. Mr. Hy. Edwards, No. 175). Four specimens examined.

Mamestra niveiguttata, *Grote,* Plate 4, fig. 16, ♂.

♂ ♀.—Eyes hairy; female abdomen pointed at the extremity, but without perceptible extrusion of the oviduct. The shape of the ♀ abdomen seems to be intermediate between Dianthoecia and Mamestra, and to weaken the validity of the former genus. Size quite small, smaller than *conspurcata.* Wood-brown, with the usual lines black, geminate, without any included whitish shades. Claviform small; orbicular vague, a little paler than the ground color. Reniform large, with a double cuneiform white spot at the extremity of the median nervure, divided by vein 4. Subterminal space deepening in color to the pale subterminal line, which latter lacks the usual W-shaped mark, and contrasting with the pale terminal space. Terminal pale dentate line, as in *cuneata,* but reduced to pale dots. Hind wings very dark fuscous. Beneath a little paler, with faint common transverse line. Body vestiture dark. Abdominal tufts obsolete, except at base.

Expanse, 26 m. m. *Habitat,* California (coll. Mr. Hy. Edwards, No. 796). Five specimens, in good condition, examined.

Mamestra (Dianthoecia?) leucogramma, *Grote.*

♂.—Eyes hairy. Smaller than *filigramma,* and with the yellow scales confined to the subterminal line, before which they appear as minute guttiform marks, following interspaceal cuneiform black dots. Median lines with distinct white centers, dentate or denticulate. The ground color is an olivaceous wood-brown. Ordinary spots moderate, rather vague, paler than the ground color. Subterminal line white. Secondaries dark fuscous, becoming paler basally, with whitish fringes. Beneath the secondaries are palest, primaries fuscous; a common line and subterminal fuscous shading. Thorax like the fore wings; abdomen untufted, except at base.

Expanse, 32 m. m. *Habitat,* California (coll. Mr. Hy. Edwards, No. 2198). The discovery of the female may place the species in Dianthoecia.

Mamestra (Dianthoecia?) 4-lineata, *Grote,* Plate 4, fig. 15, ♂.

♂.—Size small. Eyes hairy. Primaries whitish gray; the median space powdered with blackish, contrastingly dark, wedge-shaped, owing to the course of the geminate median lines. Of these the transverse anterior runs outwardly oblique, leaving the sub-basal space wide. The ordinary spots are smaller than usual and appear more crowded, tolerably distinct, pale with dark rings, rounded, with dark central scales, while a reddish stain obtains between them and soils the reniform; the small claviform is distinctly marked.

Beyond the white-shaded transverse posterior line the wing is again pale as it is sub-basally, with the s. t. line ill defined, but is remarkable for a broad black dash which accompanies vein 2. Hind wings white, a little stained apically with testaceous, without marks, remarkable for faintly repeating the black dash on the primaries at the same place—vein 2. On the pale under-surface a common line is feebly indicated, while the secondaries show a discal dot.

Expanse, 26 m. m. *Habitat*, California (coll. Mr. Hy. Edwards, No. 176). Three ♂ specimens examined. The female may have an extruded oviduct, and then we should refer the species to Dianthoecia. The pale color of the species is noticeable, reminding us somewhat of *capsularis*, from which it is very distinct.

Oncocnemis Glennyi, *Grote*, Plate 4, fig. 17, ♂.

♂.—Eyes naked, with lashes. Caputal and thoracic vestiture coarsely hairy, mixed with flattened scales. Fore tibiae with a stout terminal claw. Antennae subsimple, pubescent. Ornamentation distinct. Fore wings uniform dusty ashen, very slightly silky. Transverse anterior line perpendicular, blackish, narrowly toothed below costa, acutely lunulate on submedian space and again below vein 1. Ordinary spots larger than usual. Orbicular nearly spherical, decumbent ovate, concolorous, with a faint nucleus, edged by a blackish shade more distinct on the cell before and behind the spot. Reniform quite large, erect, not constricted, like the orbicular in appearance. Median shade apparent, approximate to t. p. line below the reniform. T. p. line geminate, the outer line obliterate, inner distinct, blackish, inwardly lunulate, marked on costa above the reniform, of the usual general shape. Subterminal line continued, of the usual appearance, pale, preceded by blackish cuneiform shades. Terminal line blackish, formed by narrow subcontinuous interspaceal lunules; fringes long, slightly silky, concolorous. Hind wings dusty fuscous, with a tolerably well expressed wide blackish terminal border; fringes pale, with an internal darker shade line. Beneath paler, with discal points and an extra mesial common line, discontinued inferiorly on primaries and accentuated on the veins of the hind wings. Thorax and head above concolorous with primaries.

Expanse, 38 m. m. *Habitat*, Colorado Territory, July 20th (coll. Theo. L. Mead, No. 36).

In the appearance of the primaries this species approaches O. Hayesi; the hind wings are more like O. Chandleri and the European species. The large size of the ordinary spots and the more usual ornamentation distinguish it.

I name this species after Mr. Wm. H. Glenny, Jr., Secretary, in acknowledgment of his kind interest in the welfare of this Society.

Oncocnemis Chandleri, *Grote.*

Habitat, Nevada (coll. Mr. Hy. Edwards, No. 2739).

Hadena arctica, *Boisduval.*

Habitat, Sierra Nevada, Cal. (coll. Mr. Hy. Edwards, No. 3513).

Hadena Bridghami, *Grote.*

Habitat, Sierra Nevada, Cal. (coll. Mr. Hy. Edwards, No. 3510).

The single ♀ specimen is in bad condition, but from its whitish secondaries and smaller size, while the ornamentation of the primaries is very similar, compared with *arctica,* it seems to be this species.

Hadena dubitans (Walker), *Grote.*

Habitat, Sierra Nevada, Cal. (coll. Mr. Hy. Edwards, No. 3512).

Hydroecia cataphracta, *Grote.*

Gortyna cataphracta huj. scrip.

Renewed examinations show me that the clypeus is smooth and has no tubercle. I correct then my former generic reference in these pages. The species can no longer be held to represent the European Gortyna flavago on this continent, though the two are similar in appearance and color.

Gortyna purpurifascia, *Grote and Robinson.*

A male from California (coll. Mr. Hy. Edwards, No. 135), seems to be this species, while differing by the more yellowish median spots on the fore wings. I have no longer my original material. The male from California *has a distinct clypeal tubercle,* and hence, if my present determination holds, the only species to be referred to Gortyna is the present; all the others wanting this tubercle, are to be referred to Hydroecia, as I have already catalogued them.

G. pupurifascia is to be distinguished by the shape and course of the transverse posterior line which *is not outwardly exserted opposite the cell*, where it is bent in cataphracta and the other species originally referred to Gortyna.

Amphipyra pyramidoides, *Guenée.*

Habitat, California (coll. Mr. James Behrens, No. 9).

The specimen does not differ from Eastern material in our collections.[2]

Agrotis depressus, Grote, Can. Nat., belongs to Amphipyra.

Noctua clandestina, *Harris.*

Habitat, Sierra Nevada, Cal. (coll. Mr. Hy. Edwards, No. 3503).

The specimen does not differ from our Eastern material which I determine as Harris' species. But, on the other hand, Fitch's fig. 6, Plate 5, 1st and 2d Reports, can hardly represent this species, though I fancy the figure is very bad.

Xylomiges curialis, *Grote.*

♂.—Eyes hairy; antennae thickly bristled beneath, with the joints distinct at the sutures, centrally widened. Caputal vestiture rough, extended forwards between the antennae; palpi lengthily haired; tongue stout, long, testaceous. Thorax quadrate, with a small posterior tuft; collar raised in front. Abdomen with a dorsal tuft at base. Fore wings narrow, elongate with dentate fringes. Very dark gray, all the transverse lines broken and more or less indistinct and incomplete. Remarkable for the veins being all marked by black scales, interrupted with pale dots. Claviform and orbicular quite small, void. The angulate blackish diffuse median shade is tolerably distinct. Reniform moderate, indistinctly margined, with a reddish stain which seems to be shared in a slight degree by the claviform and orbicular. Subterminal line continued, narrow, pale, angulated below costa and interspaceally preceded centrally by evident dark brown marks. Terminal line very narrow, hardly distinct with a following pale line at the base of the fringes. Secondaries white, with a terminal lunulate broken line; fringes white. Beneath whitish,

2 "It is here, as in almost every other genus and Family, the closet systematist divides up and arranges with insufficient knowledge of the variation which species are subject to," i. e. *Amphipyra conspersa*, Riley, "which affords," "on the very face of it," "good food for a reflecting mind." (3d Missouri Report.)

apices of primaries with a light purple stain (which may be accidental), a dotted transverse exterior, and terminal line, fringes dark. Hind wings white, a black discal dot, a black dotted median and terminal line, slightly dusted with dark scales along costa. Head and thorax dark griseous, like primaries; abdomen whitish gray with dark tuft. Feet gray; tarsi dotted.

Expanse, 35 m. m. *Habitat*, California (Mr. James Behrens, No. 8). This species has a spurious resemblance to Cerura cinerea, *Walker*.

Xylomiges patalis, *Grote*, Plate 4, fig. 11, ♀.

♂ ♀.—Eyes hairy; male antennae more shortly ciliate beneath and with the joints less prominent than in *X. curialis*. In the vestiture of head and thorax the two species agree, while the basal abdominal tuft is not so marked as in *X. curialis*. Pale whitish gray. Fore wings with a distinct black basal longitudinal liture below the median vein always distinct, whereas the ordinary marks vary in distinctness, and they are almost obliterate in one specimen. Basal space very wide and the indistinct median lines are so approximate inferiorly, that the large void claviform, distinctly black-margined, appears to overlie the t. p. line. Median spots large, void, with narrow black annuli. Orbicular obliquely decumbent, sometimes fused inferiorly with the erect reniform. Transverse posterior line with a preceding dark shade on costal region, before the angulation, and this shade is continued within the t. p. line obliquely, more or less faintly, to internal margin. Subterminal with preceding cuneiform blackish marks of which two more evident at submedian fold, and again opposite the cell. Terminal space with the nervules finely liturate. Fringes even; terminal line indistinct. Hind wings pale in ♂, without evident marks; with a median line, discal mark and subterminal fuscous shade in ♀. Beneath the fore wings are largely fuscous, terminally gray; a common line and evident discal marks; terminal line interrupted; a subterminal fuscous shade medially interrupted on the hind wings in ♀, in which sex all the markings are more evident.

Expanse, ♂ 30, ♀ 34 m. m. *Habitat*, California (No. 155, coll. Mr. Henry Edwards; Nos. 14 and 10, coll. Mr. Behrens).

A little smaller and wider-winged than X. curialis. When the markings are obliterate on the fore wings above, the darker stains before the subterminal line are yet perceivable.

Anytus, n. g.

Eyes naked, with lashes; middle and hind tibiae spinose. Male antennae not pectinate, but lengthily bristled beneath. Thorax a little flattened with sharp corners, and therefore recalling Xylina, but here the frontal hairs are

not gathered into sharp double tufts, but form a single loose tuft on the clypeus, while the hairs depend between the antennae, also in a single loose tuft. The collar is raised in front, but not hood-like as in Cucullia. Thorax with a loose tuft behind the collar, and the abdomen is tufted basally.

The species are large, purple gray, with large ordinary spots and zigzag lines, and not unlike the better marked species of Xylina, under which genus I have formerly arranged the two species.[3]

Anytus sculptus, *Grote.*

Xylina sculpta, huj. scrip.

Anytus capax.

Xylina capax, Grote and Robinson.

Cucullia Yosemitae, *Grote.*

Habitat, California (Mr. Hy. Edwards, No. 139).

A second ♀ specimen with the markings of the primaries more distinct, the outer line of the reniform indicated. The thoracic vestiture is preserved. The collar is not broad and elevated in front as in this genus, and the species must be removed from it. Unfortunately the head is defective in both my specimens so that it is impossible to examine the parts correctly. In many characters this species approaches Anytus, but differs by the more fusiform body, and the straighter margins of the fore wings which are apically more produced. The armature seems to agree while the ornamentation is very similar. My original specimen and figure merely indicate the very distinct zigzag median lines accompanied by black shades. Until more material is received I do not venture to disturb the present generic reference which, however, cannot remain.

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[3] Wenn man Lederer's dichotomische Tabelle zur Hand nimmt, um diese Arten generisch zu bestimmen, so wird man auf Ammoconia gewiesen; die Fühler des Männchens sind aber hier nicht pyramidalzähnig, sondern blos bewimpert. Grosse blau-graue Arten von einer oberflächlichen Aehnlichkeit mit *Polia ruficincta*, aber mit viel zackigeren Mittellinien, schärfere Zeichnung und bewehrten Mittel und Hinterschienen. Die Arten scheinen mir in die Verwandschaft von Xylina gehörig, wegen ihrem etwas flachgedrücktem breitem Rücken und Hinterleib, die Ecken des Rückens ziemlich scharf vorstehend.

Plusia Pasiphaeia, *Grote,* Plate 4, fig. 1, ♂.

♂.—Pale yellow with a rosy tinge, size of *aereoides* and resembling that species in the rigid transverse posterior line which is here, however, whitish, and not followed by a golden band. The costal region of the primaries and the base to the t. a. line, are very pale. The very narrow linear silvery white mark reminds one of *simplex.* It is confluent with the t. a. line, rising from the internal margin of the wing and running upwardly to median nervure where it forms a wide arc running obliquely outwardly and downwardly to a point above submedian fold, whence it runs backward and upwardly to the nervure, thus allowing the pale squamation of the costal region to extend downwardly below the m. nervure in an oblique V-shaped manner at the center of the wing. The faint obliquely placed orbicular is visible on a paler portion of the discal field, darker ringed. The subterminal space is dark, being pale fuscous and the subterminal line is dark, inwardly arcuate opposite the cell, rising again towards the margin between veins 3 and 4. Hind wings pale dusty yellow with faint wide darker borders, and faint interior line. Beneath very pale yellow with obsolete shadings. Thorax with a light purple or rosy cast, collar pale-edged. Abdomen with basal tufts. A rather slight species.

Expanse, 32 m. m. *Habitat,* California (coll. Mr. Hy. Edwards, No. 152). Two male specimens.

Plusia Putnami, *Grote,* Plate 4, fig. 2, ♂.

♂.—A brilliant species of the colors of *festucae,* but with more produced apices and rounded external margin, the primaries being more like *aereoides* in their general shape. Golden yellow, the base powdered with orange-red scales and with the linear transverse shades traced in orange-red on the costal region at base. Beyond the t. a. line the region about internal margin is washed with pale golden as in *festucae,* irrorate with orange-red scales. The angulate median shade and all the lines are comparative more distinct, but seem to have the same general course as in *festucae.* The median metallic spots are, however, very different. Of these there are two in our new species, narrowly edged with black and subspherical. Their bases rest on the interspace above the submedian fold. The first spot extends above median nervure, and is more narrowly and roundedly terminated on the discal cell. The outer and smaller spot is distinctly separate and seems to extend upwardly slightly beyond vein 2. In *festucae* the spots are fused and elongate, while the inner portion of the spot does not attain the median nervure and has a different conformation. The wing has a pale rosy tinge absent in festucae. A black dot above vein 6 at its base, the indication of the reniform. The apical golden shade is limited to paler diffuse washing, and is not extended broadly inwardly above vein 5, and emphasized as in *festucae.* Hind wings pale fuscous wanting the rosy tint of

festucae. Beneath very pale with a light ochrey tint. Thorax and head rosy, collar with a lilac edge, hence differing decidedly from *festucae*, in which the head and collar are orange red and contrast with the darker tegulae.

Expanse, 35 m. m. *Habitat*, Albany, N. Y. (coll. Mr. J. A. Lintner, No. 2743).

This species is throughout of a paler, more rosy-yellow hue than its nearest ally, with which I have compared it, thinking to render its identification the more ready. In naming this species after Mr. George P. Putnam, of the Publication Committee of this Society, I testify to an unfailing interest in the welfare of the Society, and a constant appreciation of the educational value of a study of the Natural Sciences.

Plusia Ni (*Hübner*).

Plusia Ni, Boisd., Ann. Soc. Ent. Belge.
Plusia brassicae, Riley.

Habitat, California (coll. Mr. Hy. Edwards, No. 154; Mr. James Behrens, No. 13). This is a species of apparently very general distribution, and the American specimens are not to be distinguished. I have taken Plusia Ni abundantly in central Alabama, and from my note book as early as February 20th. It varies in general tone and in the occasional detachment of the guttiform spot beyond the silver mark on the primaries, and these variations seem to have given occasion to Professor Zeller's opinion that the American specimens are distinct specifically from the European.

Lepipolys perscripta (*Guenée*).

Habitat, California (coll. Mr. James Behrens, No. 7). The hind wings in the female are fuscous. The median lines are distinctly geminate.

Alaria florida (*Guenée.*)

Habitat, Nevada (coll. Mr. Hy. Edwards, No. 2562).

Heliolonche modicella, *Grote.*

Habitat, California (coll. Mr. Hy. Edwards, No. 104).

Heliothis (Melicleptria) celeris, *Grote.*

♂.—An exceedingly brilliantly colored species of the size of *H. mitis.* Fore wings deep purple with the median and terminal spaces olivaceous. Very faint indications of the median spots, but the usual blotch below the median nervure is large, though not highly contrasted in color. Fringes purple. Hind wings intense orange-red with paler fringes and faint indications of a paler band near the base. Beneath the wings are both intense orange-red with the costal edge and fringes of primaries purple. A faint transverse paler shade on the hind wings as on upper surface.

Expanse, 17 m. m. *Habitat,* California (Mr. Hy. Edwards, No. 2585). Cannot be confounded with any other species on account of its extremely vivid and partly unusual colors. The legs and body vestiture are defective in my specimens. The pubescence seems to be paler beneath than usual, above much as in the other species of the genus.

Heliothis (Melicleptria) diminutivus, *Grote.*

♂ ♀.—A small species resembling *H. villosus, H. cardui* or *H. pauxillus.* Varies in color, so that while the fore wings are purple-red over black they are sometimes merely yellowish bronze over the dead ground color. The usual discal and inferior whitish patches, but the first (the orbicular spot) is subobsolete, and there is a third nearer the base as in *H. persimilis.* The subterminal line usually contrasts. Fringes tipped with whitish. Hind wings black with white fringes and two variable white spots as in *H. Californicus,* but greatly reduced. Beneath largely black, so that the median space appears resolved into whitish spots. Apices of primaries and internal margin pale. Apices of secondaries more largely whitish; two whitish spots appear on the median space. Body blackish; thoracic vestiture subsericeous; abdomen fringed terminally with testaceous hair.

Expanse, 13 to 18 m. m. *Habitat,* California (Mr. Hy. Edwards, No. 204). Ten specimens examined. Varies in the extent of the pale blotches on the wings, these are sometimes fused on the secondaries. Three specimens differing by the olivaceous color of the fore wings, obsolescence of the discal blotches and presence of the

median lines, appear to me to belong to H. pauxillus; they differ by being brighter tinted beneath. In either species the dots seem to be sometimes confluent on the secondaries. These three specimens are a little moulded and not in proper condition for study. H. diminutivus is apparently easily separable from H. villosus by the under-surface.

Heliothis (Melicleptria) Californicus, *Grote.*

♂.—Size of the European H. purpurascens and a little stouter than H. suetus from Colorado Territory. All the tibiae spinose. Fore wings deep purple-red over black. Some specimens have lost the intense purple-red and have a brassy-black hue. The usual markings: two whitish quadrate discal marks and a square patch below median vein, all margined by the subobsolete approximate median lines; fringes dark. Hind wings black with two large whitish spots, the upper the larger, sometimes connected; fringes whitish. Beneath grayish; wings with black bases, large black discal marks on the whitish median spaces and with wide black terminal shades, discontinued superiorly.

Expanse, 25 m. m. *Habitat,* California (Mr. Hy. Edwards, No. 93). Four specimens examined. More thickly haired and stouter than H. suetus, without the paler contrasting terminal space; the subterminal line is imperceptible in H. Californicus.

Heliothis phlogophagus, *Grote and Robinson.*

Habitat, Sierra Nevada and Oregon (coll. Mr. Hy. Edwards, No. 151); California (coll. Mr. Hy. Edwards, No. 1250).

Heliothis armigera (*Hübner*).

Habitat, California (coll. Mr. Hy. Edwards, No. 3674).

Annaphila, n. g.

A genus belonging to v. Heineman's group Anartidae, with broad and short wings, hairy vestiture and constricted eyes, hence related to Omia. The ocelli are unusually large, remote from the naked lashless compound eyes owing to the increased width of the epicranial tegument which, from its globosity, seems to cover the hinder portion of the latter. Antennae scaled, ciliate

beneath. Clypeus full, globose, exceeded by the heavily fringed palpi. Maxillae stout; wings broad, fore wings with the costal margin arched to the sharply defined apices, below which the external margin is unusually straight, the internal angle determinate, hence the length of the costal and internal margins is very similar. Hind wings broad, full and rounded. The body parts are slight in comparison to the breadth of the wings, and the abdomen does not exceed the anal angle of the secondaries.

A singular genus, recalling Brephos, (from which it differs at once by the presence of ocelli,) and certain Geometridae. The hind wings are white or yellow with Catocala-like markings.

Annaphila diva, *Grote,* Plate 4, fig. 14, ♂.

♂ ♀.—Primaries black or blackish, with the ordinary ornamentation. T. a. line deep black, strongly dentate inferiorly where it is preceded by a few white scales. Orbicular black, usually filled in. Median shade black and quite distinct. Reniform lost in a broad, oblique, contrasting white band, which fills in the median space posteriorly before the t. p. line, tapering toward internal margin, before which it is discontinued. The central waved streak of the reniform is apparent, and the ground color of the wing appears twice before the line opposite the cell, the second time more largely. Subterminal line indicated by white scales at costa, and there are white dots between this and the inception of the t. p. line. Fringes dark. Hind wings white or yellowish white with blackish basal patch, and a rather narrow terminal band with uneven inner edge. Beneath, the base of the fore wings is whitish; there is a central blackish shade, beyond which the oblique white band of the upper-surface is more diffusely reproduced, showing a black liturate mark in place of the reniform. The wing is blackish terminally with the subterminal line broadly marked with white. Hind wings white, with a black discal spot and a partial reproduction of the terminal band of upper surface; at base the dark shading of the upper surface is reflected. Body beneath, terminally and laterally, whitish; above black, with the segments marked with white. Thorax and head dark colored.

Expanse, 20 to 22 m. m. *Habitat,* California (coll. Theo. L. Mead; Hy. Edwards, No. 198). I have examined five specimens of this beautiful species.

Annaphila depicta, *Grote,* Plate 4, fig. 13, ♀.

♀.—Agrees structurally with *A. diva.* Primaries with the t. a. line roundedly exserted outwardly superiorly, a little duller colored perhaps than in *A. diva.* Orbicular small, filled in. Median shade determinate, even, a little

centrally inwardly arcuate. The dark reniform is here determinate against the narrower pale shading, which precedes the t. p. line more evenly and continuously than in *A. diva*. Subterminal line more irregular and contrasted by the terminal space, which is paler than in *A. diva*. Hind wings bright orange-yellow, with a large black lunate discal spot, a black narrow terminal band with irregular margin. Within anal angle is a black spot, indicating a possible subterminal line. Base with dusky scales defined outwardly by a transverse band. Beneath, both wings yellow. Primaries with a median black fascia, inwardly bent below costa, then running outwardly. A large black discal spot. A wide black subterminal shade not reaching internal margin. Fringes black and the apices and costal edge dusky. Hind wings with a continued extra basal angulate black line, a discal spot, a very attenuate subterminal irregular line and a subobsolete black edging indicated by a black spot, as on upper surface, before vein 2.

Expanse, 21 m. m. *Habitat*, California (coll. Henry Edwards, No. 2260).

Annaphila danistica, *Grote*, Plate 4, fig. 7, ♀.

♂ ♀.—Resembles *A. depicta* in the orange-yellow color of the hind wings above, but differs throughout, and particularly in the beautiful ornamentation of the fore wings beneath. Fore wings blackish, becoming outwardly a little paler. Orbicular a long transverse black streak with equally broad, pale, linear edgings. A black blotch on the cell between the spots. Reniform large and a little vague. T. p. line even, geminate with an included pale shade, slightly and widely roundedly outwardly produced over median nervules, thence lightly sinuate to internal margin. Subterminal line contrasted by the paler terminal space, preceded by an accentuated black shade emphasized on subcostal nervules. *An accessory, narrow, continued, even, transverse black line before the margin.* A terminal dotted line; fringes blackish. Hind wings deep orange-yellow, blackish at base and along internal margin. A black discal lunule. A narrow subterminal black line, sometimes (♂) wanting. A narrow black band along external margin with *even* interior edge; fringes blackish. Beneath the primaries are pale dull-yellow, with the discal spots vivid black, eyelike, pale-yellow circled, the space between them an outwardly oblique black extended patch. Exterior transverse line black, evenly outwardly rounded; beyond it an even pale yellow arc is bounded by another line leaving the apices dusky. Hind wings dusky fulvous, powdery, with a faint transverse line and discal liture and an even narrow dark border; fringes dark. Corporal vestiture blackish.

Expanse, 20 to 22 m. m. *Habitat*, Nevada Territory (coll. Henry Edwards, No. 246).

Differs by the external margin of the wings being a little more rounded, especially in the ♀, than in the two preceding species, with which it seems otherwise to agree structurally. This species commences to remind us of Euclidia. The remarkably beautiful though hidden ornamentation of the under surface of the primaries will always readily distinguish A. danistica.

Axenus, n. g.

The corporal vestiture is rough and coarse and the eyes are almond-shaped, constricted, and to a great extent hidden by the hairs of the small head, among which the rather large ocelli are at first not easily seen. Hence we have a correspondence with Omia,[4] from which the frontal characters seem to separate our species. The clypeus is furnished inferiorly with a broad thin plate, which extends horizontally forwards, is medially slightly excavate, as wide as the front, and is not exceeded by the comparatively short palpi. The habitus recalls some of the species of Melicleptria, such as *diminutivus*. The antennae are scaled, very finely ciliate beneath. The eyes naked and destitute of lashes. The legs appear unarmed and the maxillae are stout. The small species is olivaceous blackish, with paler powdery, transverse lines over both wings, and with long and paler fringes.

Axenus arvalis, *Grote*, Plate 4, fig. 8, ♂.

♂ ♀.—Primaries olivaceous blackish, with the terminal transverse lines visible, powdery, pale glaucous-ochreous; this pale color extends as a band over the anterior portion of the median space. Reniform visible, pale, inconspicuous. Hind wings more blackish, with a subterminal double, pale and dark, rigid line running straightly across the wing. Behind it is a pale shade, in which may be detected the pale discal dot. All the fringes variably pale and contrasting. Beneath paler than above, more yellowish. The markings of the upper surface are imitated and the pale discal dot of the primaries is evident. Body blackish, with olivaceous-ochrey vestiture.

Expanse, 16 to 20 m. m. *Habitat*, California (Mr. Hy. Edwards, No. 106).

Eight specimens examined. Quite variable in the distinctness of the transverse powdery lines. The ornamentation reminds us faintly

[4] Die ich nicht in Natura kenne, von dem sich Axenus aber sicher unterscheidet durch die Stirnbildung, die keine nabelförmigen Zapfen (also gleich Lederer's Tafel 2, fig. 11, sein soll), sondern eine horizontaler vorstehender, in der mitte seicht ausgehöhlter, schwarze Platte zeigt (Lederer's fig. 10, nicht sehr unähnlich, aber mehr nach unten gestellt, dünner, und anders ausgeschnitten).

of Drasteria or Euclidia. The female seems the darkest, and sometimes the wing appears uniformly blackish, with double pale lines on the hind wings, and the subterminal pale line alone distinct on primaries. In one specimen all the lines are obsolete on both wings and the anterior half of the median space is alone pale-colored on the primaries.

Tarache terminimaculata, *Grote.*

♂.—Eyes naked, without lashes. Clypeal surface without projection. Tibiae unarmed. Head, thorax and legs with appressed squamation. Size moderate. Scutum of the thorax large and globose. The wings widen outwardly and are strongly veined. The head, thorax and fore wings are pearly gray; primaries with a black point on the cell and with the terminal portion taken up by a large red-brown shaded space, neatly defined inwardly by an arcuate line lined inwardly with white, and which, after a short oblique outward reflection below costa, sweeps inwardly roundedly to internal margin. On the dark terminal half of the wing a blackish transverse line may be discerned below the outward projection of the white line. This dark line is tremulous and marked with a pale hair-streak at internal margin. An indistinct subterminal brown shade; the wing becoming grayish again along terminal margin. A series of black terminal points; fringes pale. Posterior wings without markings above and below, silky testaceous white. Beneath without markings, primaries darker shaded. The internal angle of the fore wings is slightly produced. Abdomen without tufts.

Expanse, 28 m.m. *Habitat,* Albany, N. Y. (Mr. J. A. Lintner, No. 1061).

A little stouter than Tarache aprica (a species subject to great variation and of which *Acontia biplaga,* Guenée, is certainly only a variety), and differing greatly from any of its congeners in ornamentation and coloration.

Tarache flavipennis, *Grote.*

♀.—Allied to *T. aprica,* and especially resembling that form of this species described as distinct by Guenée under the name of *biplaga,* but differing by the yellow hind wings and smaller size. The fore wings are almost entirely blackish with a larger white space at the middle on the costal region enclosing the black discal point, and a smaller, marking the inception of the dotted subterminal line. There is a whitish shade on the middle of the internal margin and the black dotted terminal line is concluded by a white streak at internal

angle. The fringes are blackish. Hind wings obscure yellow centrally with the veins marked with fuscous and with a diffuse fuscous costal and external shading which clouds also the base of the wing and the internal margin; fringes pale. Body blackish; abdomen ringed with whitish. Beneath both wings are yellow with narrow blackish external borders; the hind wings show a black discal dot and a second, larger, without on the costa. The fore wings have the nervules marked with fuscous and are clouded at base, and show a discal liture and two broader oblique dark costal shades before the apex.

Expanse, 20 m.m. *Habitat*, California, Sierra Nevada (coll. Mr. Hy. Edwards, No. 2590).

Two female specimens are before me agreeing in all their markings. I have compared the species in the body of the description with its nearest ally hitherto known to science.

Syneda Howlandii, *Grote.*

Habitat, California (coll. Mr. Hy. Edwards, No. 240). The specimen does not seem to differ from my original types except by the bands on the secondaries being a little broader superiorly.

Euclidia cuspidea (*Hübner*).

Habitat, California (coll. Mr. Hy. Edwards, No. 90). The specimens are not to be distinguished from our Eastern material.

Drasteria convalescens, *Guenée.*

I have taken this species in Central Alabama. It falls into a distinct section of the genus from the pectinate, geometriform antennae of the male.

Drasteria erichto, *Guenée.*

I have a single ♀ specimen in the collection, from New York, which agrees with Guenée's description in the continuity of the transverse posterior line. From the distinctness of the black subapical marks it seems to bear out the remarked resemblance to Euclidia. But I think that it is a form of our usual species occurring plentifully in this vicinity in April and May, and which expands uniformly about 37 m.m., and for which I retain this name. By breeding the species we shall discover whether this and the following are not forms of one species.

Drasteria erichtea, *Hübner.*

This resembles the preceding so that I cannot distinguish it except by size. The specimens from the Middle States taken in July expand about 42 m. m. A specimen from California (Mr. Hy. Edwards) does not differ. As forms of this species the following are tabulated:

a) *ochrea,* ♂ ♀, from Colorado Territory and California, received from Mr. Mead and Mr. Edwards (No. 68), is larger and of a uniformly pale ochreous ground color above, more yellow without markings beneath, displaying on the upper-surface the customary ornamentation of the species; the expanse is 46 m. m.

β) *agricola,* only ♀ s. known, darkly but distinctly brown, with obliterate ornamentation, no subapical dots, corresponds with Guenée's var. B, and expands 46 m. m.

γ) *mundula,* only ♀ s. known, hardly distinguished from *agricola,* the brown tint is wanting and the bands are obliterate; this is not improbably the ordinary female of the species, yet ♀ specimens occur with the markings of the male type.

Drasteria caerulea, *Grote.*

♂ ♀.—This is decidedly a distinct species, at once recognisable by its blue color, which simulates that of the paler blue and stouter forms among the Lycaenidae. Above the primaries are blue-gray, with the usual markings of the genus, the subapical dots distinct. Hind wings distinctly blue, with white fringes and distinct black border; they vary in depth of color, worn specimens become blackish; two *unusually widely separated* angulated black transverse lines are more or less apparent, but always faint, sometimes to be perceived with great difficulty. Beneath pale blue, irrorate, without markings and with narrow black borders, and here the resemblance to certain Lycaenidae is intensified.

Expanse, 20 to 22 m. m. *Habitat,* California (Mr. Hy. Edwards, No. 91).

I have five specimens before me of this strangely colored species, which is of small size, with broad wings, and cannot by any possibility be confounded with any other. Its distinct gray-blue tints are, to my knowledge, only paralleled in the Butterflies.

IX. On the North American Geometridae in the Collection of the British Museum

BY AUG. R. GROTE.

An interval of five years has elapsed since the publication of an article by the late Coleman T. Robinson and myself,[1] upon the North American Moths contained in the British Museum Collection described by Mr. Francis Walker. And now concurrent testimony to the worthlessness of Mr. Walker's determinations is borne by Professor Packard.[2] In comparing the results, reached independently by Professor Packard and ourselves, their similarity must be considered as evidence of their accuracy. There are at the outset the following differences of treatment of the material discussed in our respective articles to be borne in mind. We reviewed the entire collection of North American Moths contained in the British Museum, while Dr. Packard's published Notes relate only to the Geometridae and Pyralidae. Again, we merely corrected certain of Mr. Walker's generic references and indicated the principal synonyms, whereas Professor Packard refers to all of the species of the two families above alluded to, contained in the collection under Mr. Walker's determinations.

In the present Paper I tabulate the results of these independent observations on the Geometridae, where the same species has been considered, so that an agreement or disagreement in these determinations becomes more clearly exposed. And as to the fewer instances where Professor Packard's determinations have not accorded with our own, I would partly account for them by the more critical study which Professor Packard has bestowed upon our Geometridae for several years past, and have thus no doubt that the later determinations are

[1] Notes on the N. Am. Lepidoptera contained in the British Museum Collection and described by Francis Walker; Trans. Am. Ent. Society, July, 1868.

[2] Notes on North American Moths of the Families Phalaenidae and Pyralidae in the British Museum; 5th Ann. Rep. Peabody Academy of Science, July, 1873.

to be generally preferred. But these discrepancies are mostly trivial and do not affect the principal result of our respective criticisms. They are in part owing to a different conception of the genera Epione and Eurymene; in part also to our here erroneous extension of Numeria. The most important discrepancy has arisen in the genus Caberodes. Mr. Walker's seven species of this genus seemed to us referable to two; while Dr. Packard assumes them to belong to four species. These species were at any rate very closely allied, and the single specimens by which the majority of them were represented, afforded us no grounds for separation at the time. With a more critical knowledge of the genus, Professor Packard's determinations must be accepted. It is, however, not impossible that some changes may have taken place in the collection during the interim of five years between our own and Professor Packard's visits. This becomes probable when we see that a few of Mr. Walker's frequent re-descriptions of the four species, Endropia hypochraria, *H.-S.*, Macaria granitata, *Guenée*, Acidalia enucleata, *Guenée*, and Azelina Huebneraria, *Guenée*, are not alluded to by Professor Packard. These species turn up every now and then in unexpected places in the collection and under unrecognisable generic and specific descriptions in the catalogue, filling, in the Geometridae, the role which Mr. Walker assigns to Lygranthoecia marginata in the Noctuidae. For the few species which Professor Packard here recognises as distinct, in subversion of our earlier determinations, we trust Professor Packard will furnish descriptions in the expected Monograph of the North American Geometridae.

Grote and Robinson.	Packard.
1868.	1873.
Choerodes translucens = ♂ Eutrapela clemitaria.	*id.* = ♂ Eutrapela clemitaria.
Choerodes transferens = ♀ Eutrapela clemitaria.	*id.* = ♀ Eutrapela clemitaria.
Epione calipusaria belongs to Eurymene.	*id.* = Sicya solfataria.
Epione agyllaria = Epione calipusaria.	*id.* [is a distinct species.]

Endropia refractaria = ♀ Endropia hypochraria.	*id.*= Endropia hypochraria.
Endropia mestusaria = ♂ Endropia hypochraria.	*id.*= Endropia hypochraria.
Endropia oponearia = Endropia madusaria.	*id.*= Endropia madusaria.
Ellopia panissaria = *Ellopia? amyrisaria* and belongs to Numeria. [From the determinations opposite I judge the material has been changed.]	*id.* is E. pultraria and End. lateritiaria. *Ellopia? amysaria* is a Caberodes too much rubbed for description. *Ellopia plagifasciata* belongs to Numeria.
Caberodes? agreasaria = Endropia lateritiaria.	*id.* Endropia lateritiaria.
Tetracis pandaria is = ♂ Caberodes remisaria. [The determination opposite leads me to suppose the specimens of Caberodes have been shifted. In any case this Tetracis is a Caberodes and the species must fall away.]	*id.* is a large rubbed Caberodes metrocamparia.
Azelina? zalissaria seems to be a variety of Azelina Huebneraria; it differs by the exterior line being straight. [Since both Dr. Packard and ourselves consider this an undoubted Azelina, Mr. Walker's doubtful generic determination makes his description confusing. Azelina Huebneraria seems to me to vary in this direction.]	*id.* is a true Azelina closely allied to A. Huebneraria. It is a good species.
Selenia aesionaria, Azelina neonaria, and *Macaria laticincta* are the same species, belonging to Hyperetis, and closely allied to, if not identical with, Hyperetis alienaria, *Guenée.*	*Selenia aesionaria* is a large singular species of Hyperetis. *Azelina neonaria* is a true Hyperetis alienaria. *Macaria laticincta* is a Hyperetis allied to Hyp. alienaria.

Acidalia restrictata = Acidalia enucleata. [I do not know whether Professor Packard has noted that the black subterminal shading is a sexual character; to this Mr. Walker pays no attention.]	*id.* [Retained as a distinct species.]
Boarmia defectaria = Boarmia larvaria.	*id.* = Boarmia larvaria.
Boarmia sublunaria, B. signaria, B. indicataria, and *Tephrosia intractaria,* all refer to one species = B. sublunaria, *Guenée?*	*Boarmia signaria* and *Tephrosia intractaria* are both = Boarmia sublunaria. Boarmia indicataria [is a distinct species].
Boarmia intractaria = Boarmia momaria.	*id.* = Boarmia momaria.
Boarmia ephyraria = Boarmia humaria.	*id.* = Boarmia humaria.
Tephrosia spatiosaria is partly B. sublunaria and partly B. humaria.	*id.* = Boarmia sublunaria.
Tephrosia amplaria = Bronchelia liriodendraria.	*id.* = Bronchelia liriodendraria.
Bronchelia disserptaria = Bronchelia liriodendraria.	*id.* = Bronchelia liriodendraria.
Macaria haliata = Macaria granitata.	*id.* = Macaria granitata. Not even a variety!
Macaria? indeclinata = Endropia hypochraria.	*id.* = Endropia hypochraria.
Macaria irregulata = Macaria granitata.	*id.* = Macaria granitata.
Tephrosia dispuncta = Macaria granitata.	*id.* is a Macaria.
Melanippe reciprocata = Odezia albovittata, *Guenée.*	*id.* = Odezia albovittata, *Guenée.*

On the authority either of Professor Packard or ourselves, Mr. Walker has re-described Endropia hypochraria, *H.-S.*, under the following names: *Endropia refractaria, Endropia mestusaria,*

Macaria? indeclinata, and *Azelina faedaria.* On the same authorities Mr. Walker has re-described Macaria granitata, *Guenée,* as *Acidalia? fissinotata, Macaria haliata, Macaria irregulata, Macaria retinotata, Macaria? refusaria, Tephrosia dispuncta* and *Larentia? exnotata!*

A discussion of Dr. Packard's valuable notes on the Pyralidae does not enter into the limits of the present Paper; but I cannot help adding that analogous conclusions are reached with those here presented in the Geometridae. A prominent disclosure affecting Mr. Walker's descriptions in the Pyralidae was stated by us in the following terms:

The following descriptions of species referred to Hypena by Mr. Walker, viz., *H. generalis, H. rufinalis, H. idaeusalis, H. cacuminalis, H. habitalis, H. sobrialis, H. factissalis, H. caecalis,* are to be rejected from that genus and should be entirely ignored, since the specimens upon which they are founded are so defective, that the species are irrecognisable, and, instead of belonging to the Deltoid or Noctuid genus to which they are referred, they belong to different genera of Crambidae and Tineidae.

The general correctness of this remark is verified by Professor Packard's observations on these species. According to Prof. Packard, *Hypena rufinalis* "is a Crambus," *H. idaeusalis* "is perhaps a Tineid," *H. cacuminalis* "is too much rubbed for description," *H. sobrialis* "is not a Hypena," while *H. caecalis* is doubtfully retained in this genus.

On the other hand, *H. factissalis* is not mentioned by Professor Packard, while *H. generalis* and *H. habitalis* are retained as referring to distinct species. *H. bijugalis,* Walker, is considered a variety of *H. Baltimoralis* by Prof. Packard. We regard it as distinct and have described and figured it in the Transactions of the American Entomological Society.

X. Statistics and Distribution of North American Lichens

BY HENRY WILLEY, NEW BEDFORD, MASS.

[*Read before this Society, October 3d,* 1873.]

An attempt at presenting the statistics and the geographical distribution of the Lichens of North America, must necessarily be imperfect, owing to the fact that but a small portion of the continent has been thoroughly explored in search of Lichens; so that new species may be expected to occur, even in the more familiar districts, while considerable accessions to our knowledge may be expected in those which have, as yet, been hardly visited by the Lichenist. The present attempt, therefore, is offered only as an approximation to exactness.

In my "List of North American Lichens" as known at the commencement of 1872, there were enumerated 808 species and subspecies, some being ranked as species, which will hereafter, probably, be reduced to varieties. The additions and corrections since made to that list (which are given in an Appendix to this paper) swell the total to 823, subject to the same reservation in regard to species and varieties. This estimate does not include a considerable number of species collected but not described or published; with the addition of these and other discoveries which may be made, the whole number of North American Lichens may finally reach between 850 and 900; the whole number of Lichens at present known and described being from 1,500 to 2,000, and of Lichens occurring in Europe, about 700. New species are being constantly published, but the title of many of them to rank as such may well be doubted, as it depends to a great extent, on minute chemical differences, as to the value of which Lichenists are not agreed.

Of the five Tribes into which Lichens are divided, according to the arrangement of Professor Tuckerman in his "Genera Lichenum,"

which is that followed in this paper, the Parmeliacei contain in North America, 38 Genera and 411 species; the Lecideacei, 10 Genera and 218 species; the Graphidacei, 11 Genera and 79 species; the Caliciacei, 3 Genera and 40 species; the Verrucariacei, 10 Genera and 75 species. Of the 18 families into which these five tribes are divided, the Usnei contain 7 Genera and 67 species; Parmeliei, 5 Genera and 52 species; Umbilicariei, 1 Genus and 21 species; Peltigerei, 5 Genera and 38 species; Pannariei, 2 Genera and 27 species; Collemei, two sub-families, 7 Genera and 68 species; Lecanorei, three sub-families, 12 Genera (including Myriangium) and 412 species; Cladoniei, 3 Genera and 57 species; Coenogonii, 2 Genera and 3 species; Lecideei, three sub-families, 5 Genera and 217 species; Lecanactidei, 3 Genera and 8 species; Opegraphei, 3 Genera and 31 species; Glyphydei, 2 Genera and 3 species; Arthoniei, 3 Genera and 79 species; Sphaerophorei, 3 Genera and 6 species; Caliciei, 3 Genera and 40 species; Endocarpei, 2 Genera and 10 species; Verrucariei, three sub-families, 8 Genera and 75 species.

The geographical distribution of the species is shown in the following table. In the first column is shown the number of species and sub-species in each genus; in that marked *N.*, the number of Northern species; *S.*, of Southern species, including the territory south of Pennsylvania, the Ohio river, and thence west to the Southern boundary of California; *G.*, species more or less widely distributed in both of these regions; *W.*, species occurring only west of the Mississippi, and north of the column indicated by *S.* (including also a few Arctic species as hereafter noted); *Alp.*, Alpine and sub-Alpine species; *Arc.*, Arctic species; *Tr.*, Tropical and sub-Tropical species; *N. Am.*, species peculiar to North America; *Eu.*, species occurring also in Europe; *N. E.*, species occurring in New England.

	No. Sp.	N.	S.	G.	W.	Alp.	Arc.	Tr.	N. Am.	Eu.	N. E.
I.											
1. Roccella,	2	1	1		1					1	
2. Ramalina,	24	10	12	2	6	1		10	10	5	3
3. Dactylina,	3	3			1	1	2		2	1	
4. Cetraria,	20	16		4	3	5	3		4	14	14
5. Evernia,	5	3	1	1	2	2		1		4	2
6. Usnea,	6	1		5			1			2	5
7. Alectoria,	6	4	1	1	1	3	3	1		6	3
8. Speerschneidera,	1		1					1	1		
9. Theloschistes,	3			3						3	3
10. Parmelia,	34	12	6	16	3	6	4	6	9	20	19
11. Physcia,	13	6	3	4	1			3	4	7	8
12. Pyxine,	1			1							1
13. Umbilicaria,	21	16		5	5	10	3		7	12	10
14. Sticta,	23	5	12	6				12	3	11	7
15. Nephroma,	4	1	1	2		1		1	1	3	3
16. Peltigera,	8	3	1	4		1		1		7	7
17. Erioderma,	1		1					1	1		
18. Solorina,	2	2					1			2	1
19. Heppia,	1			1						1	1
20. Pannaria,	26	11	5	10	2	1	3	3	7	16	16
21. Ephebe,	3	1	1	1				1	2	1	2
22. Lichina,	1	1							1		1
23. Synalissa,	8	5	2	1				1	4	3	4
24. Omphalaria,	4	1	3					2	2	2	1
25. Collema,	28	11	5	12			1	3	13	13	11
26. Leptogium,	23	7	8	8	3		1	7	8	12	12
27. Hydrothyria,	1			1					1		1
28. Placodium,	28	16	3	9	10	4	5	3	13	15	10
29. Lecanora,	52	33	5	14	15	12	5	5	14	34	21
30. Rinodina,	12	8		4	1	2	2		4	7	7
31. Pertusaria,	18	9	2	7	1	1	5	2	5	11	7
32. Phlyctis,	1	1								1	
33. Conotrema,	1			1						1	1
34. Gyalecta,	9	5	1	3	1		1	1	2	7	7
35. Urceolaria,	2			2						2	2
36. Thelotrema,	14		12	2				12	4	2	2
37. Gyrostomum,	1		1					1			
38. Myriangium,	1			1						1	1
II.											
39. Stereocaulon,	14	8	5	1	1	5	1	5	5	5	7
40. Pilophorus,	1	1				1				1	1
41. Cladonia,	36	18	7	14		8	1	6	10	25	26
42. Coenogonium,	2		2					2			
43. Cystocoleus,	1		1					1			
44. Baeomyces,	6	2	2	2		2		1		5	4
45. Biatora,	67	39	10	18	12	6	10	10	13	47	35
46. Heterothecium,	10	2	6	2		1		6	1	4	3
47. Lecidea,	43	38		5	10	20	11		7	36	21
48. Buellia,	38	32		6	11	4	7		17	21	8

	No. Sp.	N.	S.	G.	W.	Alp.	Arc.	Tr.	N. Am.	Eu.	N. E.
III.											
49. Lecanactis,	2	1	1		1	1				2	1
50. Platygrapha,	4	2	2		1			2	2	1	1
51. Melaspilea,	2	1	1					1	2		1
52. Opegrapha,	12	3	5	4				3	6	4	7
53. Xylographa,	3	3				1			2	1	3
54. Graphis,	17	1	14	2				12	2	3	3
55. Chiodecton,	2		2					2			
56. Glyphis,	1		1					1			
57. Arthonia,	34	13	12	9	2	3	1	12	15	15	17
58. Mycoporum,	1			1							1
59. Agyrium,	1	1								1	1
IV.											
60. Siphula,	2	2			2		2		1	1	
61. Sphaerophorus,	3	3				3				3	2
62. Acroscyphus,	1		1					1			
63. Acolium,	8	6	2		4	1		2	4	3	2
64. Calicium,	23	14	2	7	1	2		1	5	20	19
65. Coniocybe,	3	2		1					1	2	3
V.											
66. Endocarpon,	8	2	2	2	2	1			2	6	4
67. Normandina,	2	1		1						2	2
68. Segestria,	2	1	1					1		1	1
69. Staurothele,	4	3		1					3	1	2
70. Trypethelium,	9		8	1				8	2		1
71. Sagedia,	5	1	1	3				1	2	3	4
72. Verrucaria,	20	14		6		3	1		5	15	10
73. Pyrenula,	21	4	12	5			1	11	5	8	8
74. Pyrenastrum,	2		2					2	1		
75. Strigula,	2		2					2	1		
	823	410	190	232	103	112	75	171	236	363	399

An interesting feature of our Lichen Flora, is the fact that a number of species which occur in Europe, have as yet been found only in the western portion of North America, from Nebraska to the Pacific, only a few of which are connected with Europe through the intervening Arctic region, which are indicated in the following list:

1. Dactylina madrepiformis.
2. Evernia divaricata.
3. E. vulpina.
4. Alectoria Fremontii.
5. Umbilicaria rugifera.
6. U. murina.
7. Solorina crocea (Arctic).
8. Leptogium albo-ciliatum.
9. L. scotinum.
10. L. palmatum.
11. Placodium fulgens.
12. P. callopismum.
13. P. variabile.
14. P. sinapispermum (Arctic).
15. P. fulvo-luteum (Greenland).
16. Lecanora crassa (*or* lentigera).
17. L. verrucosa (Arctic).
18. L. Schleicheri.
19. L. peliscypha.
20. L. rhagadiosa.
21. Rinodina aterrima.
22. Pertusaria bryontha (Arctic).
23. P. dactylina (Arctic).
24. Gyalecta rhexoblephara (Arctic).
25. Biatora decipiens.
26. B. globifera (Arctic).
27. B. glebulosa.
28. B. cinnabarina (Arctic).
29. B. cuprea (Arctic).
30. B. castanea (Arctic).
31. B. quernea.
32. B. erysibe.
33. B. artyta.
34. B. sphaeroides.
35. Lecidea mamillaris.
36. L. vesicularis.
37. L. vitellinaria (Arctic).
38. L. borealis.
39. L. turgidula (Arctic).
40. L. atro-brunnea (Arctic).
41. L. insularis.
42. L. caulescens.
43. L. epigaea.
44. L. badia.
45. Lecanactis abietina (Arctic).
46. Arthonia impolita.
47. Siphula ceratites.
48. Acolium tympanellum.
49. Endocarpon cinereum, v. cartilagineum (Greenland).
50. Phacopsis vulpina.

Of the relation of our Lichen Flora to that of Asia and Japan, I have little information. The following, originally published as American, have been found in the regions indicated.

Cetraria Richardsonii..... Siberia.	U. Muhlenbergii..... Siberia.
C. chrysantha..... Japan.	U. Pennsylvanica..... Asia; Japan.
Umbilicaria rugifera..... Siberia.	Collema leptaleum.... Japan.

Alectoria Fremontii, Cetraria Oakesiana, Thelotrema subtile, and Conotrema urceolatum, occur in Europe; Usnea cavernosa, in S. America and India; U. angulata, in S. America and New Zealand; Ramalina reticulata, in New Zealand; Pannaria leucosticta, in New Zealand; and R. tenuis, is cosmopolitan. These lists might doubtless be extended.

APPENDIX.

The following additions and corrections to my list of North American Lichens are here noted.

ADDITIONS.

Evernia intensa, Nyl., Flora, 1872..... Mexico.
Parmelia crinita v. eciliata, Nyl., Flora, 1869..... Mexico.
P. praesignis, Nyl., Flora, 1872..... Mexico.
P. colpodes v. cristulata, Nyl., Syn. p. 404..... North America.
P. tiliacea v. sublaevigata, Nyl. (P. sublaevigata Nyl.)..... North America.
† P. livida Tayl., Nyl., Syn. 383..... New Orleans.
P. perforata v. cetrata, Nyl., Syn. p. 378..... New Orleans.
Physcia setosa (Nyl.), Syn. p. 429..... Mexico.
P. obscura v. compacta, Nyl., Syn. p. 428..... Arctic.
Umbilicaria cylindrica v. Delisaei, Nyl., Scand. p. 117..... Arctic.
Sticta pallida, Hook..... Mexico.
**Placodium murorum v. tegulares, Fw..... New England.
P. arcticum (Kbr. Parerg. p. 63)..... Labrador.
*Lecanora caesio-alba, Kbr..... New York.
L. cupressi, Nyl. Flora, 1873..... North America.
L. cinerea varr. ** lacustris, Nyl. *Hoffmanni, ib..... North America.
L. rhagadiosa, Ach..... Yellowstone.
Rinodina sophodes varr. ** atro-cinerea (Nyl.) ** roboris (Duf.) New England.
*R. aterrima (Kremph.)..... California.
** Pertusaria leioplaca v. marginata, Nyl., En. p. 336..... North America.
P. pustulata v. schizostoma, Nyl., ib. p. 336..... New England.
P. paradoxa, Linds., W. Greenland, p. 344..... Greenland.
Thelotrema postpositum (Nyl.), N. Gr. p. 552..... Louisiana.
Stereocaulon denudatum v. caespitosulum, Nyl., Syn. p. 247. New England.
S. strictum, Th. Fr. Ster. p. 42..... Mexico.
S. albicans, Th. Fr. Ster. p. 63 (S. nanum Ach. saltem pp.)... New England.
Cladonia uncialis v. turgescens, Schaer..... United States.
Heterothecium leptocheilum, Tuck. (Nyl. Antill., p. 14)..... Mexico.
H. chloritis (Tuck.), Nyl. N. Gr. p. 66..... Southern.
*Lecidea mamillaris (Gouan)..... Yellowstone.
L. Campsteriana, Linds. l. c., p. 358..... Greenland.
L. Vahliana, Linds. ib., p. 358..... Greenland.
Buellia discoensis (Linds.), ib. p. 356..... Greenland.
B. Egediana (Linds.), ib. p. 330..... Greenland.
B. Groenlandica (Linds.), ib. p. 351..... Greenland.
B. insignis, Naeg., Linds. l. c., p. 355..... Greenland.

B. papillata v. albo-cincta, Th. Fr..... Northwest.
Opegrapha subvulgata, Nyl., Flora, 1869..... Mexico.
Graphis pruinosa (Eschw.), Nyl., N. Gr. p. 564 ..... Mexico.
Segestria nucula v. granulata, Nyl., Antill., p. 22 ..... Mexico.
Verrucaria Campsteriana, Linds. l. c., p. 343 ..... Greenland.
[*This and* V. tartaricola Linds. *are probably parasitic fungi.*]
§ Pyrenula subelliptica, Tuck., Lea Cincinn. p. 47..... Ohio.
Phacopsis vulpina, Tul..... California.

Opegrapha antiqua, Lesq., in Hayden's Report, 1873, pp. 370, 418, is the only fossil Lichen as yet recorded on this Continent.

CORRECTIONS.

Umbilicaria mammulata, Ach.= U. spodochroa.
U. polyphylla v. deusta = U. flocculosa Hoffm.
Sticta crenulata, Del.= S. Ravenelii T. = S. erosa (Eschw.).
Pannaria Michneri, T. = P. molybdaea Pers. f.
Synalissa lignyota should be S. fuliginea (Wahl.).
Lecanora coniza, T. = L. subf usca.
Urceolaria hybocarpa, T. = L. subfusca, f.
Stereocaulon chlorellum, T. is not a species, the specimens belonging to Ramalina.
Biatora leucoblephara, Nyl., perhaps does not differ from B. tricholoma, Mont.
Lecidea grossa, Pers. should be transferred to Heterothecium.
Arthonia pruinosa, Ach. = A. impolita (Ehrh.).
Page 10, after No. 202, insert: 6. Spores muriform, plurilocular.

Postscript.—Since these pages were sent to the printer, I have had the opportunity of examining the Lichens collected by Dr. Coulter, Botanist to the United States Exploring Expedition to Colorado, during the summer of 1873. Among them are three which are new to the United States, but occur in Europe, as follows:

1. Solorina bispora, Nyl.
2. Lecanora calcarea (L.), Smf., with an elegantly effigurate thallus.
3. Endococcus erraticus (Mass.), Nyl. Parasitic on Placodium elegans.

XI. Kleiner Beitrag zur Kenntniss einiger Nordamerikanischer Lepidoptera

VON AUG. R. GROTE.

[*Read before this Society, October 3d,* 1873.]

Der geehrte Herr Professor Zeller hat die Güte gehabt, eine kleine von mir determinirte Sammlung Nordamerikanischer Schmetterlinge und Motten mit seiner Sammlung zu vergleichen und zu bestimmen. Ich nehme jetzt die Gelegenheit einige synonyme Berichtigungen zu machen, die zum Theil auf eine beinahe gleichzeitige Publication beruhen, zum Theil durch eine Unkenntniss von dem in Amerika Publicirtem entstanden sind. Einen starken Contrast bieten die jetzigen Publicationen des Herrn Professor Zeller über unsere Lepidopterenfauna, mit denen des Herrn Walker's. Während wir von Deutschland zuverlässige Bestimmungen, sorgfältige Beschreibungen und eine passende Rücksicht erfahren, haben wir das Gegentheil von England und zum Theil von Frankreich erlitten; und es wird uns sogar zugemuthet, von Seiten des Brittischen Museums, eine unwissenschaftliche und im allerhöchsten Grad unzuverlässige Publication blos deshalb zu verschmähen, weil der Autor uns zuvorgekommen sei.

Ich zähle hier einige von den Arten auf, die ich an Herrn Professor Zeller schickte, mit Beisetzung seiner betreffenden Bemerkungen.

Hesperia communis, *Grote,* Can. Ent.

Ueber diese Art, die im südlichen Theile von Alabama zahlreich vorkommt, schreibt mir Professor Zeller: "Ich habe sie in der Sammlung unter dem Namen *Hesperia albovittata,* Mus. Berol."

Nolaphana malana.

Brachytaenia malana, Fitch, p. 244.

Ich habe an Herrn Professor Zeller die echte *malana* (*Brachytaenia malana*, Fitch) geschickt, und ich bekam folgende Bestimmung: "Nola malana ♂, so von Dr. Speyer bestimmt. Die zweite sehr ähnliche Art hat im ♂ ungekämmte Fühler, und solche schickten mir die Herrn Burgess und Packard als *malana*. Meinen Artikel muss ich berichtigen, weil ich beide Arten nicht schied." Wenn man die Beschreibung von Fitch vergleicht, so wird man von der Richtigkeit der Bestimmung des Herrn Dr. Speyer überzeugt sein. Bei Fitch heisst der Vorderrand "outer edge" oder "margin." Seine Phrase: "From the middle of the outer margin a straight black line extends obliquely towards the inner angle, and ends abruptly near the middle of the wing," betrifft zwar beide Arten, bezeichnet aber gut die breitere Querlinie von *malana*, die scheinbar an der äusseren und unteren Ecke der Mittelzelle endet. Er sagt entschieden: "The antennae in the males are pectinated with two rows of short, robust branches." Bei der Zeller'schen Art aber heisst es: "Aber die ganz ungefransten Fühler des ♂ und der Mangel des Schuppenhöckers am untern Ende des Wurzelgliedes lassen die Errichtung einer besonderen Abtheilung zu." Fitch's Abbildung seiner *malana* ist ganz falsch und passt nicht zu seiner Beschreibung. Es scheint mir, dass beide Arten nicht mit Nola verbunden werden können. Für die Zeller'sche Art schlage ich den Namen *Zelleri* vor. *Nolaphana malana* hat Nebenaugen, vorgestreckte Palpen, starke Zunge, hinter der Basis der Fühler am Scheitel eine ohrenartig erhöhte Beschuppung. Es wird für *Zelleri* eine Unterabtheilung anzunehmen sein, welche *Asisyra* heissen kann. (Dass v. Heinemann Callegenia als Unterabtheilung zu Nola zieht, wo so vieles widerspricht, wird gewiss nicht zugelassen werden.) Im ♀ Geschlechte sind die Hinterflügel bei beiden Arten dunkel oder schwärzlich, was bei Fitch nicht erwähnt wird. Ich hoffe, dass wir wieder von Professor Zeller über die beiden Arten, seinem Versprechen gemäss, hören werden.

Caradrina miranda, *Grote.*

Das Weibchen habe ich an Herrn Professor Zeller geschickt und er schreibt mir: "ähnlich Lepigoni ♀, mir neu."

Anomis xylina (*Say*).

Ueber diese Art schreibt mir Herr Professor Zeller: "habe ich mehrfach aus Texas, ohne Namen, daher ist mir der Name sehr lieb." Diese Art kommt auch schaarenweise bei Buffalo im September und Oktober vor, und scheint mir vom Süden eingewandert; bis jetzt haben wir die Raupe nicht gefunden, ihre Futterpflanze, die Baumwolle, gedeiht hier nicht. Die Art ist von Guenée unter dem Namen *bipunctina* beschrieben, und gewiss früher von Hübner, Zutr., fig. 399–400, abgebildet und auf Seite 32, als von Bahia, *Aletia argillacea* benannt. Es stimmt d. südliche Fundort mit meiner Behauptung überein, dass das Thier unserer Fauna nicht zugehört, sondern von Mexico und den West Indischen Inseln jedes Jahr eindringt und die in den Vereinigten Staaten jährige Baumwollpflanze verwüstet. Man vergleiche in dieser Hinsicht Seite 122 und 123 dieses Bandes, und zwei Aufsätze von mir im Rural Carolinian, 1871 und 1872.

Colobochila interpuncta, *Grote.*

Madopa interpuncta, Grote.
Colobochila saligna, Zeller.
Colobochyla interpuncta, Grote.

Meine Art aus Alabama ist gewiss der Zeller'schen aus Texas gleich. Es fehlt bei mir die Beschreibung einer der 3 Pünktchen, den ich an meinen zwei Exemplaren nicht bemerkt habe.

Sudariophora callitrichoides, *Grote.*

Phyprosopus callitrichoides, Grote.
Sudariophora nasutaria, Zeller.

Herr Professor Zeller schreibt mir über diese interessante Art, dass der von mir publicirte Name den "Vorrang hat." Aber mit Recht tadelt Herr Professor Zeller, zu gleicher Zeit, die Schreibart des generischen Namens. Anstatt meinen Namen jetzt zu berichtigen, ziehe ich vor den Namen beizubehalten, den Herr Professor Zeller der Gattung gegeben hat, was nicht mehr als Recht ist, wenn man auf beinahe gleichzeitige Publication Rücksicht nimmt. Es ist auch die Zeller'sche Beschreibung der Gattung die bessere, und es fehlt bei mir die Erwähnung der Mentum appendicibus duabus pendulis, elongatis, die von Herrn Professor Zeller ganz passender Weise als sudarii bezeichnet worden sind. Dagegen findet sich bei

mir eine Beschreibung der minder erwähnungswerther Rippenverlauf, die von Herrn Professor Zeller nicht untersucht worden ist. Ich hoffe dass in der Zukunft keine bibliognostichen Friedensstörer meinen Gattungsname auferwecken mögen, wodurch meine Freude sicher gestört würde. (In meinem 2ten Aufsatz ist der Name der Gattung Pangrapta, *Hübner*, zweimal falsch geschrieben, jedoch in meinem 3ten Aufsatze richtig zu finden. Daselbst ist Xanthoptera coccineifascia verdruckt, ein Fehler der auf der letzten Seite nicht mehr vorkommt.)

Und nun zu Sudariophora callitrichoides. Das Thier wird von Professor Zeller zu den Spannern, von mir aber zu den Noctuinen gerechnet, und als mit Calpe und Hemiceras verwandt angesehen. Herr Professor Zeller schreibt mir in dieser Hinsicht: "Dass die Gattung Ocellen hat, habe ich irgendwo gelesen, und sonach wäre es eine Noctuine von spannerähnlichem Aussehen. Daher werfe ich die Frage auf: ist der Mangel von Ocellen bei den Spannern Regel ohne Ausnahme? Was sagt die *Raupe* dazu?" Die letzte Frage kann ich nicht beantworten, denn die Raupe von S. callitrichoides ist mir nicht bekannt. Dass das Thier zwar kleine, aber deutliche Ocellen besitzt, habe ich mit Hülfe des Mikroscops wahrgenommen und Herr Professor Zeller hat die Angabe vielleicht in einem meiner Briefe gelesen. Gegen Clemens' Behauptung scheint Professor Zeller die ächte Doryodes acutaria, wie Guenée, zu den Spannern zu rechnen.

Asopia costalis (*Fabr.*).

Von mir seit einigen Jahren so bestimmt und, wenn ich nicht irre, von Herrn Riley durch meine Bestimmung im Prairie Farmer veröffentlicht. Unsere Exemplare scheinen sich nicht von den Europäischen specifisch zu unterscheiden. Herr Professor Zeller schreibt mir darüber: "sicher in Europa und Amerika gleich." Die Art hat eine Flügelspannung von 16 bis 18 m. m.

Asopia olinalis, *Guenée.*

Asopia trentonalis, Schlaeger.

Diese Art, von den Staaten New York und Pennsylvania, unterscheidet sich von *costalis* durch bedeutendere Grösse, dunklere und trübere Färbung, verhältnissmässig kleineren Costalflecken der Ober-

flügel (der Aussenfleck nach unten zugespitzt), mit mehr sichtbaren Mittellinien. Es sind bei meinen Exemplaren drei Costalhäkchen vorhanden. Flügelspannung 20 bis 24 m. m. Herr Professor Zeller schreibt mir: "meine *Himonialis* hat die beiden Querlinien der Vorderflügel viel näher und nur zwei Costalhäkchen dazwischen."

Pseudasopia, n. g.

Scheint mir zwischen *Asopia* und der mir unbekannten Zeller'schen Gattung *Endotricha* zu stehen. Entschieden von *Asopia* durch die Anwesenheit der kleinen Nebenaugen zu trennen. Zunge kurz, anliegend beschuppt. Palpen am Kopfe aufsteigend mit kurzen versteckten vorgeneigten Endgliedern. Nebenpalpen vorhanden; an den Fühlern finde ich keine besonderen Merkmale. Beine ziemlich lang, anliegend, die Schenkel dicht, beschuppt. Vorderflügel mehr wie doppelt so lang als breit, sonst im Flügelschnitt der bekannten *Asopia farinalis* zu vergleichen.

Pseudasopia squamealis, *Grote.*

Diese Art hat mehligbeschuppte gestreckte Flügel, die enger wie gewöhnlich erscheinen. Vorderflügel röthlich braun mit schwarzen Atomen vermischt. Die beiden Querlinien weit entfernt, fein zackig, fahl-gelb mit schwarzen Schattirungen auf dem Mittelfelde. Die gewöhnlichen Costalflecken sind hier auffallend klein und nur Erweiterungen der Querlinien. Die äussere Querlinie entspringt bei ¾ des Vorderrandes (und ist gleich darunter auswärts gebogen) und ist also dem Hinterrande ungewöhnlich nahe gelegen. Fransen aller Flügel schwärzlich, mit feiner dunkler Theilungslinie. Rücken röthlich braun. Hinterflügel braun-grau, spärlich beschuppt, mit dunkler von einem hellen Schatten gefolgter fein zackiger Bogenlinie bei ⅔; Saumbänder röthlich angeflogen. Unten sind alle Flügel staubfarbig oder braun-grau, von einer feinzackigen Aussenlinie durchzogen, die nach Aussen hell begränzt und die der Oberseite entspricht. Saum aller Flügel wieder röthlich erscheinend; also gleicht die Unterseite aller Flügel der Oberseite der Unterflügel. Flügelspannung 24 bis 26 m. m. Mehrere Ex. bei Hastings, New York, in Juni gefangen. Das Geader habe ich bis jetzt nicht untersuchen können. Unter diesem specifischen Namen habe ich das Thierchen Herrn Professor Zeller mitgetheilt, dem es neu war.

Botis gentilis, *Grote.*

Major, abdomine ♂ elongato, cinerascente, albido-annulato; alis pallidissime flavidis, griseo-mixtis, in disco subiridescentibus, anteriorum maculis 2 discalibus annuliformibus, strigis 3 fuscescenti-cinereis, secunda repanda cum macula secunda lineis conjuncta, tertia serratissima. ♂ ♀.

Botis Thesealis, Zeller (non Led.), S. 514.

Ueber diese Art schreibt mir Herr Professor Zeller, dass (nach Rogenhofer i. l.) sie nicht die Lederer'sche Art sei, die in dem Mus. Caes. steht. Als *Botis pertextalis* habe ich eine nahe stehende Art bestimmt, welche greller gezeichnet ist. Ein einziges Exemplar im Buffalo Verein's Museum scheint mir zu *Botis abdominalis* Z., gehörig. *Botis gentilis* ist eine der gewöhnlichsten Arten.

Botis magistralis, *Grote.*

Die grösste mir bekannte Art aus der Verwandschaft von *gentilis, pertextalis* und *abdominalis;* fast so gross wie *flavidalis.* Hell graulich gelb, mit greller bräunlicher Zeichnung und fast durchsichtige Flügel. Die Adern sind von bräunlichen Atomen mehr oder weiger vollständig bedeckt, ein gegittertes Aussehen die Flügel gebend. Der Costalrand ist breit bräunlich gelb. Der Saumband ist auch bräunlich gelb, von der braunen scharf gezeichneten gezahnten 3. Querlinie wurzelwärts gefolgt. Discalflecken dick und gross, braun, wenig heller gekernt. Ein langer brauner Wisch auf dem Mittelfelde, über der Falte liegend, in Zelle 2. Hinterflügel mit greller Fortsetzung der Zeichnung: Saumband hell gelblich. Alle Flügel stark irisirend. Auf der Unterseite ist die Zeichnung weniger stark wieder gegeben. Kopf und Rücken graulich braun; die Beine und Brust weisslich. Palpen oben braun, unten weisslich. Flügelspannung 30 bis 35 m. m. Aus Massachusetts.

Anmerkung. Da ich vermuthlich früher *oxydalis* und *flavidalis* nicht schied, so ist es wahrscheinlich dass ich *lacoalis* zu *oxydalis, cinctipedalis* dagegen zu *flavidalis* setzen sollte, anstatt beide Walker'sche Arten zu *oxydalis* zu ziehen.

Botis subdentalis, *Grote.*

♂ Grösser und weniger grell gefärbt als *marculenta,* die gewiss richtig von Zeller bestimmt wird, und nur der Abbildung nach einige Zweifel lassen kann; es sind bei unseren "Descriptions" eben die Beschreibungen und nicht die Abbildungen der Arten genauer zu nehmen. Alle die Querlinien deutlicher als bei *marculenta* der

Fall ist. Fahl- oder hell-ocker-gelb. Die äussere Mittellinie läuft beinahe gerade herunter bis zur Rippe 5, dann mit einer Ausbuchtung bis 2, sodann unegale Zähne bildend zum Innenrand verlaufend. Die 3. Querlinie, vor dem Hinterrande, ist auffallend breit, regelmässig gezähnt und erinnert an *Botis gentilis*, dem die neue Art an Grösse gleicht. Die feine bräunliche Hinterrandlinie, so wie die Fransen, sind von Schattenstreifchen, die auf den Zellen liegen, durchschnitten. Hinterflügel mit schwachem Mittelpunkt, geschlängelte Mittellinie, *die nach dem Hinterrande zu verlöscht, nicht wie bei* gentilis, u. a. A., *einwärts unter Rippe 2 wieder erscheinend*, sondern *auf dem hier weisslichen Flügel Spuren einer Fortsetzung in fortlaufender Richtung zeigt.* In dieser Beziehung zeigt *subdentalis* eine Verwandschaft mit *marculenta*. Es kann schon deshalb nicht *serratissimalis* sein, da die Querlinie der Hinterflügel nicht stumpfwinklig gebrochen ist und den Vorderrand erreicht, obwohl das Thierchen sich auch durch seine gelbliche Färbung und dadurch dass die zwei Discalflecken nicht ringförmig sind, sich von *gentilis* underscheidet. Die Mittelzelle scheint mir auch nicht kürzer zu sein als bei *Botis* der Fall ist, und so, wenn ich mich auch im Geschlechte irre, kann meine Art nicht zu *Crocidophora* gehören. (C. pustuliferalis, *Led.*, kenne ich aus Alabama.) Unten weisslich gelb, schwach irisirend, die Zeichnung wiedergegeben aber verloschen. Kopf, Rücken und Hinterleib fahl-gelb; Unten weisslich, die Beine dunkler. Diese Art entbehrt alle gesättigtere ocker-röthliche Färbung. Flügelspannung 22 m. m. Aus der Umgegend von Buffalo. Leicht von *marculenta* zu unterscheiden durch den verschiedenen Verlauf der äusseren Mittellinie und die gezackte 3. Querlinie, die sich auf dem Hinterflügel fortsetzt.

Anaphora agrotipennella, *Grote.*

Can. Ent. p. 137 ♂ July, p. 142 ♀ Aug., 1873.

Ebenda habe ich eine zweite Art aus Alabama mit weisslichen Oberflügeln als *Anaphora mortipennella* beschrieben. Ueber *agrotipennella* schreibt mir Herr Professor Zeller: "Ich habe sie als *Anaphora scardina* beschrieben, und das Manuscript befindet sich in Wien." Es ist mir sehr wahrscheinlich dass Pinaris hamiferella, *Hübner*, Zutr., S. 14, fig. 441–442, aus Rio Janeiro, und Acrolophus vitellus *Poey*, Cent. Lep., aus Cuba, zu Anaphora gehören oder damit verwandt sind.

XII. Description of the genera Argyrophyes and Condylolomia and of a species of Deuterollyta

BY AUG. R. GROTE.

[*Read before this Society, October* 23, 1873.]

Argyrophyes,[1] n. g.

Ocelli wanting. Maxillae rudimentary, entirely concealed by the prominently long, very thickly scaled labial palpi (Plate 5, fig. 1), which exceed the front, their third article directed forwards. Wings full; primaries (Plate 5, fig. 2) large, with evenly arcuate costa, straight external, and consequently long internal margin; 10-veined; cell long, closed; 2 to 5 at decreasing intervals; 6 from the cross vein; 7 to apex; 8 out of 7 to costa; 9 from upper and outer angle of the cell to costa; 10 and 11 wanting. Hind wings (Plate 5, fig. 3) rounded, rather disproportionally smaller, 7-veined; cell incompletely closed, angulated; vein 5 wanting; no accessory internal veins; on both wings the cells are undivided.

The species is frail, white, pulverulent, with somewhat the outline of Homophysa, so that at first, and considering the bushy palpi, the insect might be considered as Pyralidous. The neuration differs essentially, however, from that type; the absence of ocelli and the rounded secondaries are Geometridous characters. The antennae are simple, scaled, provided beneath with longer and very fine hairs in the male, in the female these are shorter, two on each of the well-exposed joints; the caputal scales are massed about the antennal insertion.

Argyrophyes cilicoides, *Grote.*

Pure white, shaded with smoky brown. Fore wings with a raised blotch of black metallic scales at the extremity of the cell; opposite and beyond this, inside of the transverse line, are a few more scattered dark scales. The terminal portion of the median space, on which the metallic blotch is placed, is

[1] Gr.: ἀργύρεος et φυή.

transversely shaded with pale smoky brown. The transverse posterior line is indicated by darker scales. It is lightly sinuate, outwardly rounded opposite the cell. Subterminal line fine, quite distinct, pale smoky brown, nearly perpendicular, a little irregular, twice more prominently indented. There are very faint indications of basal transverse shade lines; fringes white. Hind wings white, with a smoky discoloration inside the fringe, more prominent towards the apices. Beneath, the fore wings are dark smoky brown, except along internal margin near the base, where they are white as are the fringes. Hind wings white with faint dot and smoky shadings. Body parts white; a faint mixture of brown scales is perceivable under the glass, especially on the legs. The insect distantly recalls in appearance the European Cilix spinula.

Expanse, 16 m. m. My specimens were collected in New Jersey.

Condylolomia,[2] n. g.

Vein 8 of the secondaries (Plate 5, fig. 5) anastomising with 7; veins 3 and 4 of the fore wings (Plate 5, fig. 4) furcating. In the male the costa, beyond the cell, at a little beyond basal third, is provided with a fold within which is concealed a tuft of hair. At the base, at costa, *above* the cell, is a rounded blister. Fore wings with the outer margin straighter than usual, resembling Asopia. Vein 1 with an incomplete subbasal lower branch. Cell aborted, hardly one-fourth as long as the wing; veins 3 and 4 furcate; 5 thrown off from the upper side of median vein a little without the lower angle of the cell; 2 below and beyond 5, about one-third of the distance between 5 and the furcation of 3 and 4. Vein 6 from the discal cross-vein near the middle to costa, just before the apices; 7 to costa near 6; 8 out of 7 to costa at the center of the wing; veins 9 to 11 wanting; 12 an abortive veinlet, apparently skirting the basal blister and joining the costa at the commencement of the costal fold. Ocelli. Body slender, tortriciform; labial palpi porrect, as long as the front, coarsely scaled; terminal joints projected forwards. Tongue spiral. Maxillary palpi not detected. Antennae (♂) moderate, finely pubescent beneath.

Condylolomia differs from any hitherto described genus of Pyralidae in the 9-veined primaries. It agrees with *Duponchelia*, *Stegothyris* and *Paraponyx*, in that veins 3 and 4 of the primaries are furcating (Lederer's Plate 2, fig. 26), vein 5 arising from the median vein before the origin of vein 2 below. It approaches in costal character *Cnaphalocrocis* and *Crocidolomia*, but here the swelling is at base *above* the very short discal cell, and the fold, concealing a

[2] Gr.: *κόνδυλος* et *λῶμα*.

pencil of hair, beyond the discal cell, is apparently different in character from the costal ornamentation of the Asiatic *Crocidolomia*.

Condylolomia participialis, *Grote*.

♂.—The fore wings are smooth, dark ochrey yellow, more or less washed and shaded with vinous red, especially terminally. There is no perceptible ornamentation except an outer transverse even slightly arcuate pale shade line with a preceding reddish stain. Hind wings dark fuscous, a little pale at costa. The fringes are rather long, glistening, dark reddish on primaries, pale fuscous on the hind wings. Beneath paler, testaceous with obscure reddish shadings. Primaries the darker, with a transverse line at $\frac{3}{4}$, followed by a pale outward shading and corresponds with that on the upper surface. Hind wings pale yellowish, with the inception of a transverse shade marks on costa. Abdomen above fuscous, the prominent anal tuft and under-surface yellowish. Legs dusty yellowish; middle and fore tibia reddish outwardly. Thorax and head above like the primaries.

Expanse, 14 m. m. *Habitat*, Pennsylvania (No. 8).

Deuterollyta borealis, *Grote*.

♂.—From the base of the antennae two long scaled processes extend backwards over and close to the thoracic surface, reaching to the mesothorax, and resembling in position the palpi of Anaphora. Labial palpi exceeding the head, third joint long and pointed; maxillary palpi present, very short. Fore wings dusty yellowish gray with powdery black lines. Inner middle line determinate on costa, irregular. A black discal dot inside of the narrow median shade. Outer middle line irregularly denticulate, produced about vein 4, thence running inwardly below vein 3, whence it descends very slightly outwardly projected to internal margin. Terminal field wide; a wide blackish terminal shade band, tinged with brown, notably so at about internal angle. A terminal series of well-marked interspaceal blackish marks, becoming continuous inferiorly; fringes whitish. Hind wings fuscous, the veins darker marked; a discal dot very near the base and costal border; a terminal strongly marked line; fringes whitish. Beneath pale yellowish gray; a common line and discal dots; the marginal shade band less prominent. Thorax and head above like primaries. Legs concolorus; tibiae marked outwardly with black.

From Cambridge, Mass. Collected by J. C. Merrill (No. 9). *Expanse*, 20 m. m. Kindly determined as D. conspicualis, *Led.* (from Brazil), on Lederer's authority, for me, by Prof. Zeller, but differing decidedly by the greater width of the terminal spaces on both surfaces, the irregularly denticulated exterior lines which are more inwardly placed, the smaller size and paler color.

XIII. Description of a Butterfly new to the Lower Lake Region

BY AUG. R. GROTE.

[*Read before this Society, October* 23*d*, 1873.]

Callicista, n. g.

Eyes hairy. Antennae very slender, a little more than half as long again as the abdomen; club prominent, cylindrical, comparatively short. Fore tibiae about five-sixths the length of hind tibiae. Fore wings with the costal margin a little more than half as long again as internal margin; external margin equal in length to internal margin, sinuate, being unusually strongly inwardly retreated from below vein 3 to internal angle. Cell less than half as long as the wing. Hind wings broadly elongate ovate, internal margin nearly twice the length of the abdomen.

Callicista seems to have its nearest ally in Strymon, *Hübner*. It is more Hesperiform than any of the Theclid genera.

Callicista ocellifera, *Grote.*

♂.—Wings *above*, dark bronzy brown. On the cell of primaries a large blackish sexual spot. On hind wings two black spots before the external margin, near the anal angle, apparently resting on an extremely fine pale hair streak; fringes whitish. Wings *beneath*, pale dull violet brownish gray. Primaries with three terminal series of white lunules on the interspaces descending from the costal region. The first series fainter, marginal, continued, following the shape of the external margin; the second consisting of three lunules, terminating on the interspace above vein 4; the inner series preceded by blackish spots, opposite the cell smaller and parallel with the second band, but, below vein 4, two spots are placed outwardly and continued below the second series. Hind wings with two basal, blackish pupilled, white ringed, rather large distinct spots, recalling those in Everes in position. A mesial band of black pupilled, white ringed, ocellate spots, a little *waved* and irregular, the spots unequally defined; beyond, a subterminal series of unequally V-shaped white marks, accented outwardly by dark shades, the points turned towards the base of the wing; a terminal series of white lunules, with dark outer shade spots, interrupted by a large black spot, between veins 2 and 3, surmounted by a vivid orange yellow shade, and containing a few metallic points. A black fringe dot at the anal angle. A marginal whitish narrow

line, faintly noticeable, also, on the fore wings; fringes dark. A darker linear shade on the cross-vein of secondaries, perceivable within the mesial band.

Length of fore wing, along the costa, 11 m. m. *Breadth, from apex to internal angle,* 7 m. m. *Length of internal margin,* 7 m. m. *Total length of body,* 9 m. m.

This pretty little species was taken by Mr. Ottomar Reinecke, near Aurora, about 17 miles southward from Buffalo, on the Buffalo, New York and Philadelphia Railroad. The locality presents a succession of hilly eminences, covered by a moderate growth of hemlock, mixed with deciduous trees. The specimen was taken on the 13th of July. On the same occasion Argus Eurydice was quite abundant. Mr. Edwards, in his synopsis of North American Butterflies, enumerates 39 species under the genus Thecla, of which number, 15 are from California, 1 from Utah (*affinis*), and 1 from Nevada (*cygnus*); a single species (*halesus*) enjoys a range from Florida to California, while another (*mopsus*) is found from New England to Colorado Territory. Mr. S. H. Scudder records 12 species, from New England, under 6 genera. It is probable that Callicista ocellifera will be in future added to the list, as its range is not likely to be confined to this region of country. Our butterfly is remarkable for its resemblance to Everes on the under surface of the secondaries, but here there is but one marginal black spot and superposed broad orange luniform shade, while in Everes there is a succeeding one, here absent, a few black scales on the succeeding interspace indicating its position. On this account, also, it resembles Lampides Balliston, *Hübner,* fig. 229–230, from Georgia. It is a much smaller and narrower insect, however; on the under side the two prominent ocellate spots at base of secondaries are not indicated by Hübner, who represents a single larger ocellus on internal margin, wanting in *ocellifera.* On the primaries there are double discal streaks, and the black spots accompanying the inner *even* transverse bands on both wings are wanting, in *Balliston.* On the primaries the transverse lines are much less complete and much more crowded on to the external margin, having a very different position, in Callicista ocellifera. Hübner's species is not catalogued by Mr. Edwards. The European L. Boeticus may be considered the type of Lampides.

XIV. Description of three Genera of Noctuidae

BY AUG. R. GROTE.

[*Read before this Society, October 23d*, 1873.]

Hadena turbulenta.

Phosphila turbulenta, Hübner, Zutr. S. 15, figs. 67, 68.
Amphipyra? turbulenta, Walker.

Ocelli. Eyes naked, with lashes. Antennae (♀) simple, sparsely and finely pubescent. Thorax tufted, on the disc behind the collar. Abdomen with slight dorsal tufts. Tibiae unarmed. Slender-bodied; squamation pulverulent on the wings, hairy on the legs and thorax. Bright brown; fore wings widening at outer third, paler outside of the t. p. line. Median lines approximate inferiorly; t. p. line superiorly outwardly projected, double, the inner line most distinct, lunulate-dentate. Costal region between t. p. and subterminal line dark brown, relieving the pale costal dots. Subterminal line faint; on the subterminal space the veins are darker marked. Two prominent dark brown parallel streaks, fused by a dark shade, rest on the submedian interspace above internal angle. Hind wings pale brown, with an even, outwardly pale shaded, transverse line opposite the t. p. line of primaries; a faint discal streak and diffuse darker terminal shade. Fringes on primaries dark, cut with pale at the extremity of the nervules; on secondaries pale reddish with a dusky outer shade. Beneath duller hued, with discal dots and common line. Noticeable from the inward position of the t. p. line of primaries and transverse line of the hind wings.

Expanse, 28 m. m. Albany (Lintner); Georgia (Hübner). A species not noticed by Guenée, and referred without any apparent reason to Amphipyra, by Walker, from Hübner's figures.

Homohadena, n. g.

Ocelli. Eyes naked, with feeble (?) lashes. Tibiae unarmed. Thorax with smooth unelevated discolorous collar, the disc untufted. Abdomen without tufts, a little flattened (♀). Maxillae moderate. No frontal protuberance. Size moderate. Differs from *Hadena* by the untufted thorax and abdomen. Ornamentation peculiar; ordinary spots and subterminal line obsolete; median lines even, flexous, approximate; t. p. line strongly arcuatedly projected opposite the cell; a brown dash from base to t. a. line, below submedian vein, continued more faintly across the median space to an opposite notch on the t. p. line; a second large dash on the cell continued beyond the t. p. line. Brown; hind wings whitish in ♂; fuscous in ♀.

Homohadena badistriga.

Hadena badistriga, Grote, Trans. Am. Ent. Soc., p. 20, 1872.

Albany (Lintner); New York (Grote); London, Canada (Saunders). Larva on the common Honeysuckle (Lonicera sempervirens); chrysalis in a tolerably firm cocoonet. At the time I originally described the species, Mr. Lintner kindly drew my attention to the fact, that I had wrongly described the eyes as hairy.

Adipsophanes,[1] n. g.

Ocelli. Eyes naked, without lashes. No clypeal projection. All the tibiae unarmed. Antennae of the usual (2/3 of the costal) length. Thoracic vestiture smooth. Palpi equally thickly scaled, but very slightly exceeding the front. Abdomen without tufts. Clypeus without tuft, closely, shortly and thickly (contrastedly) scaled. Head not retracted. Legs smoothly scaled, but with longer sparse hair on the outer surface of the hind tibiae. Fore wings with the external margin rounded, the long fringes projected very slightly at internal angle. Vein 8 of the hind wings out of the upper margin of the cell; general habit recalling Caradrina. Antennae (♂) simple, scaled above, with exceedingly short and fine down beneath. Palpi thickly scaled, third joint small, more closely scaled. Maxillae moderate.

In using Lederer's analytical table we refer this moth as allied to Stilbia, among the European genera, from which it differs by the absence of secondary sexual disparities, the simple antennae, the absence of a mesothoracic tuft and the contrastedly colored, close velvety clypeal squamation (as compared with the paler and longer scales of the vertex). The form is slender; wings elongate, pale colored; ornamentation Leucania-like. It approaches in general appearance and form very closely to Guenée's *Crambodes talidiformis*, but in that species the antennae are subpectinate, the clypeal surface is not discriminated by its vestiture, the terminal palpal joints are longer, more obtuse and broader.

Adipsophanes miscellus,[2] *Grote.*

♂ ♀.—Fore wings pale brownish gray, with fine interrupted black lines on the veins accompanied by narrow whitish shades. The usual ornamentation obsolete. Terminal space darker tinted. An interrupted terminal blackish line; the long pale brownish fringes cut with whitish opposite the veins. Hind wings white, subtranslucent, with a brown line and pale brownish terminal shade fading to anal angle, more obvious in ♀; fringes white. In the ♀ there is an exceedingly slight indication of a transverse line from nervular

[1] Gr.: ἄδιψος et φαίνομαι.

[2] Spec. sub No. 2 ad cel. Zeller misi.

flecks, apparent also beneath on the dusted costal region. Beneath, without markings; fore wings pale brownish; hind wings white; terminal lines well marked. Squamation slightly lustrous. Body parts gray; clypeal surface blackish.

Expanse, 28 m. m. *Habitat*, New York (Albany, *Lintner*); Pennsylvania; Massachusetts; quite common, and in all collections. The types are in the Collection of this Society.

Plagiomimicus,[3] n. g.

Ocelli. Eyes naked, without lashes. Clypeus with a broad naked cup-like depression, the raised edges forming inferiorly a wide semicircular corneous projection, below which a corneous ridge crosses the face above the moderately slender maxillae. Labial palpi shorter than usual. Legs unarmed. Fore tibiae with a stout terminal curved spine. Antennae simple, with short hairs beneath on the joints (♂). Squamation scaly, as in Lygranthoecia, not hairy, as in Heliolonche and Heliothis. Thorax short and square; tegulae laterally spreading, with elevated terminal scales. Abdomen without tufts, very little exceeding the hind wings.

Plagiomimicus pityochromus, *Grote.*

♂ ♀.—Color of *Lygranthoecia marginata* and *L. Thoreaui*. Median lines narrow, distinct, white; transverse anterior a little inwardly depressed in its general course above the median vein, about which it forms a faint angle, thence straightly to internal margin; transverse posterior running outwardly from costa to vein 6, where it is angulated, thence descending with an inward sweep evenly to internal margin which it joins (running inferiorly parallel with the t. a. line) at within $\frac{2}{3}$ from the base, narrowing the median space inferiorly. Discal spots evident, elongate, lying in slightly opposed positions, black (especially the orbicular), surrounded by narrow white borders, constricted medially, figure 8-shaped. Subterminal line preceded on costal region by a darker, large triangular shade which obtains between the t. p. and s. t. lines superiorly. Hind wings a little paler than primaries, similarly tinted, plain. Beneath without markings; fringes concolorous. Body parts like the wings.

Expanse, 20 m. m. *Habitat*, Alabama; Albany (Lintner). Size of *Lygranthoecia marginata*, with the primaries more widely triangulate. From both species of *Lygranthoecia*, specifically easily separable by the paler more olivaceous general tint, the apically produced transverse posterior line and the distinct guttiform discal spots, and generically by the frontal excavation. The type is in the collection of this Society.

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[3] Gr.: πληγή et μιμικός.

XV. On Wallengren's "Lepidoptera Scandinaviae Heterocera disposita et descripta."

BY AUG. R. GROTE.

The meritorious work of H. D. J. Wallengren on Swedish Moths (Lund, 1863), has not, as yet, received our attention. The first part (Closterocera) is before us, and a brief reference to certain points presented by it may be of interest. Following Duméril and Boisduval, Wallengren assumes divisions higher than Families for the Moths, but although their definitions are more extended, they are not recommended to acceptation by any more important contradistinctions than when first announced by the French Entomologists. And although Wallengren says, "Closterocernes antennform skiljer dessa fjärilar genast från alla Nematocera och Chetocera" (p. 4), he leaves out of consideration the American Zygaenoid genera, certain of which are not separable from Wallengren's Nematocera on antennal characters. To his exception "Paranthrena," (properly written Paranthrene, *Hübner*, S. 128), must now also be added the Texan Setioid genus Zenodoxus, *G. and R.* To the gradual modification of the antennae throughout the Suborder (more perceivable, perhaps, in our American fauna) is owing a gradual change in structure which necessarily makes any κέρας classification unnatural and impossible.[1]

Wallengren retains the less compact Smerinthoid species in the highest position among the Sphingidae. We object to this on the ground that their Bombyciform analogies, unprismatic antennae (g. Cressonia, etc.), and weak abdomen, are characters of inferiority. The transformation of Haemorrhagia is more like that of the Hesperidae, and the diurnal flight of Hübner's Bombyliae (Vulgares), is a character entitling them to highest rank. The aborted maxillae and nocturnal flight of Smerinthus are characters indicating a

[1] See the paper on Antennal Structure, read before the Portland Meeting of the American Association for the Advancement of Science.

lower rank in the Family. No generic separation of the European species of Smerinthus is made by Wallengren, but such is evidently demanded. Although the European *Smerinthus tiliae* is enumerated first by Latreille under his genus, yet it cannot be considered his type while he cites *ocellatus* under the same name, and which latter species we have separated as typical of the genus in our Catalogue. Laothoe *Fabr.* and Delina *Dalman*, appear to be cast for the same species, and to be in reality, intended as = Smerinthus *Latr.* The former has been used for the European *populi*, and we have considered this species as the type. Nor does this arrangement interfere in the slightest with Hübner's Verzeichniss, a work to which we would accord the fullest authority and weight. We have taken for Hübner's genus Paonias the type P. excaecatus, which (with *Myops* and *Salicis*) he includes on p. 142. This genus is (excluding *Salicis* as the type of Smerinthus) unrepresented in Europe, and contains two, if not three, American species. Calasymbolus, *Grote*, is also unrepresented in Europe: its type, *Astylus*, is not mentioned by Hübner. For the European *tiliae*, Hübner's genus Mimas must be retained: there are no described American species. We have already proposed to restrict Polyptychus *Hübner*, to Cramer's *dentatus* as the type. Quite distinct from any of the other species included under Polyptychus and more strongly marked, perhaps, than any of the other Smerinthoid species, the American *juglandis* has already been separated under Cressonia.

Wallengren, unhappily (and unnecessarily), refers Philampelus, *Harris*, as a synonym to Choerocampa. The proper type of this genus is *Philampelus satellitia*, Harris (nec Linn.), *Daphnis Pandorus* Hübner; the genus is unrepresented in Europe. Wallengren's idea is probably taken from Burmeister's fusion of the genera in the "Sphingidae Brasiliens." Nor does Wallengren separate D. nerii, as the type of Daphnis *Hübner*, as has been correctly done by Curtis. Quite unnecessarily, Wallengren erects a new genus for the European Macroglossum stellatarum, already originally considered as the type of Scopoli's genus. Wallengren has, evidently, taken the prevalent European idea of "Macroglossa," without exercising literary research. For Hemaris *Dalman* (to which Boisduval has referred S. fuciformis as the type), Wallengren uses the incorrectly written term "Macroglossa."

XVI. On the Butterflies of Anticosti

BY AUG. R. GROTE.

[*Read before this Society, October* 31, 1873.]

This Society has received from Mr. William Couper a collection of Lepidoptera made in the months of June and July, on the Island of Anticosti, which lies in the Gulf of St. Lawrence, between latitudes 49° and 50°. I am under obligations to Mr. Samuel H. Scudder for his opinion on the eight species of Diurnal Lepidoptera collected by Mr. Couper. Two additional species of Grapta have been reported, though not seen by me, making ten species of butterflies in all known from the island. No species of Oeneis were observed. Five of the species received present no features of particular interest. These are: Vanessa Atalanta, Argynnis Atlantis, Phyciodes Tharos, Cyaniris Lucia and Cyclopides Mandan. The other three I notice more fully, as follows:

Glaucopsyche Couperi, *Grote.*

This species differs from *Lygdamus* and *Pembina,* in having a much broader dark margin to the wings. The male (25 m. m.) is more largely pale greenish blue above, over the dark ground color, which, in the female (27 m. m.) obtains, the blue color being confined to the basal and discal fields of the wings. Beneath white shaded over dark, with a subterminal series of 7 black-pupiled white ringed spots on the interspaces, and a discal ocellus on the primaries. Hind wings with a twice broken subterminal series of 9 ocelli with obsolete pupils, 2 more coalesced on the disc, 1 above on costal region. Fringes whitish.

Ganoris oleracea, *Scudder,* var *borealis.*

The markings on the veins are much darker and broader than usual, especially beneath. The species thus resembles *frigida,* but the elongated form of the hind wings peculiar to *frigida* is totally wanting. This is a renewed example of the interesting fact that white butterflies assume darker colors when inhabiting elevated localities or higher latitudes.

Papilio brevicauda, *Saunders.*

The specimens agree in the special position of the markings with the Newfoundland form. There is a variation in the length of the tails, and the coloration is more that of the continental P. Polyxenes (Asterias). The form is a segregated geographical one. While the female *brevicauda* approaches in excess of yellow color the male, in the Southern States the male Polyxenes seems to approach the ordinary female type.

XVII. Notes on North American Lepidoptera

BY H. K. MORRISON, OLD CAMBRIDGE, MASS.

[*Read before this Society Nov.* 21, 1873.]

Family **LYCAENIDAE.**

Lycaena pseudofea (*nov. sp.*).

Expanse, 17 m. m. *Length of body*, 6 m. m.

Palpi above dark brown; beneath white, clothed with scattered stout black hairs, most numerous on the second and third joints. Front dark, with narrow conspicuous white lines encircling the eyes. Antennae alternated white and black, club at its commencement dark reddish-brown, shading to red at the tip; body above dark brown, almost black; beneath whitish. Wings above uniform dark brown, deeper at the base, and there concolorous with the body; anterior wings without defined markings; posterior wings with a series of five small submarginal black spots, the three nearest the anal angle distinct, the other two sometimes almost obliterated; fringe concolorous, without any trace of white. Beneath, ground color of a uniform brown, considerably lighter than above; anterior wings with a white ring (enclosing a spot of the ground color) .5 m. m. in diameter in the center of the basal third of the wing, resting upon the median nervure at its junction with the fourth median nervule; beneath and touching this ring, another, bounded above by the median nervure and fourth median nervule, and resting on the submedian nervure. This latter is an ellipsis, major axis .75 m. m., minor, .50 m. m. It is the nearest to the base of the wing. Two submarginal rows of faint white spots, situated between the nervules. Between the basal rings and the two submarginal rows of spots, the wings are crossed by four white parallel lines, interrupted by the nervules and obliterated slightly before the costa and inner margin of the wings. These lines are perpendicular to the costa, and not parallel to the submarginal spots. Posterior wings beneath, with a series of three white rings (enclosing spots of the ground color) directly beneath each other, and in the basal third of the wings. A submarginal band of six conspicuous black spots between the nervules. Before this a narrow white band surrounding the spots, and extending between them along the nervules. The spot nearest the anal angle is almost entirely covered with metallic green, and the rest of the spots present detached scales of this color, generally on the side nearest the margin. The disc of the wings between the submarginal band and the three white rings is covered with a series of interrupted white lines.

Described from three specimens. Types in the collections of Edward Burgess and H. K. Morrison.

Hab., Key West, Florida. Specimens taken February 8th and 9th. This species belongs to the same section of the genus as exilis, *Boisd.*, from California, and fea, *Edws.*, from Texas. But it can at once be distinguished from the latter to which it is closely allied, by the absence of the metallic blue reflection on the basal third of the anterior wings above, by the concolorous ground of the wings above, and below, without the broad red bands of *fea*, and by the presence of the two white rings in the basal third of the anterior wings beneath.

There are also other differences which can be seen from the description.

I am indebted for the opportunity of describing this beautiful species, to my friend Mr. Edward Burgess of the Boston Society of Natural History.

Lycaena cassius, *Cram.*, Var. floridensis (*nov. var.*).

Expanse, ♂ 20 m. m. ♀ 22 m. m.

♂.—Palpi above black; beneath the first two joints white, the third black tipped with white, all three clothed with thick black hairs; antennae black and white; club black, tipped with white; body black above; beneath white with a yellowish tinge; wings above of a deep marine blue, with a slight metallic reflection; anterior wings with a very narrow black border along the costa and outer margin; fringe black, changing to white at the inner angle. Posterior wings with the disc of a lighter blue; a black border a little wider than that of the anterior wings; fringe white; the markings beneath show slightly above; beneath the ground color is white with brown markings; anterior wings with a series of six marginal spots between the nervules, those nearest the inner angle being double; next to these and separated by the ground color, a submarginal line formed of united lunules; this line extends uninterruptedly to the fourth median nervule; from this to the inner margin it is continued by a long faint lunule; the next line is short, extending from the costa to the disco-central nervule; the third extends from the costa to the third median nervule; these last two are formed of connected lunules. The fourth is broad, uninterrupted, extending to the median nervure; from the median to the third median nervule it is represented by a faint narrow line. The fifth line is narrow, continuous from the costa to the inner margin. The sixth line forms a broad continuous band, the sides of which are parallel until they reach the median nervure, and from that point commence to diverge until they reach the inner margin—width of the band on the median nervure .75

m. m., on the inner margin 2.5 m. m.—thus forming a broad triangle resting on the inner margin. The seventh line formed of lunules and not quite touching the costa, which from it to the base is brown. The eighth line is reduced to a long lunule parallel to the costa. The base and disc of the posterior wings covered with brown spots and lines of various shapes; a submarginal band of united lunules, surmounting a marginal series of six spots, situated between the nervules; the two anal spots are deep black, each surrounded by a ring of chrome yellow; the second of these spots is the largest; they both contain a lunule of metallic blue nearest the outer margin, and have also detached scales of the same color scattered over them.

♀.—Anterior wings above, white, with a very broad black border extended from the base along the costa to the apex, where it is much thickened, and from the apex to the inner angle, as in *L. neglecta* ♀. The base of the wing and three bands corresponding to the principal ones below, are suffused with a metallic blue reflection; the middle band extends from the black costal border across the disc to the inner margin; the outer band is an arm from the submarginal black border, and is only suffused with blue internally; posterior wings with a blue reflection at the base; a black border formed of the submarginal lunules and spots, which are united at the costal angle, but separate towards the anal angle; the two black spots beneath, particularly the second, are reproduced conspicuously above; beneath the markings are the same as in the male, except that they are lighter, and in the posterior wings the discal bands are only represented by a few isolated spots.

Hab., Key West, Florida. Taken from Feb. 1 to 10. Types in collections of Edward Burgess and H. K. Morrison.

This species is the representative in our fauna of the Central and S. American *cassius*, and will perhaps ultimately be considered distinct from it. But in the large series of specimens which I examined from different localities, I was unable to find any constant specific characters separating the two, although the Florida form could readily be recognized by its general appearance.

Thecla modesta.

Lycaena modesta, Maynard, Amer. Nat., Vol. 7, March, 1873, p. 177.

This species is not a Lycaena but a Thecla, belonging to a group which has not until now been found within the limits of the United States. *Modesta* is extremely close to, if not identical with, an undescribed species which I have from Jamaica and Cuba.

The insect fauna of Key West is tropical in its character, and intimately connected with that of the West Indies, while it differs entirely from that of Florida, the nearest main land.

Family **ENNOMIDAE.**

Eurymene excavaria (*nov. sp.*).

Expanse, 31 m. m. *Length of body*, 11 m. m.

♀.—Head and collar violet-black, the latter edged with ferruginous; body above ochreous; terminal segment of the abdomen ferruginous, anus violet black; body beneath and legs uniform ferruginous. Anterior wings with the apex pointed; a very strongly pronounced angle between the second and third median nervules (much more so than in any species of the genus known to me); outer margin between the angle and the apex concave; below the angle the margin is very deeply indented; inner angle slightly rounded; anterior wings with the ground color pale ochreous, almost hidden except at the base and apex by numerous transverse, brown striae; a narrow violet-black costal border, continuous with the collar, lined interiorly with red, extending one third of the distance between the base and apex; a very thick dark reddish-brown line, commencing on the inner margin two-thirds of the distance from the base to the inner angle, and continuing perpendicularly until a short distance before the fourth median nervule; at this point it changes its course about thirty degrees to the right, extending in this direction until within 1.5 m. m. of the costal margin, where it stops abruptly; bordered internally with brighter red, externally with violet, which extends to the inner angle; the indentation below the angle, in the outer margin, bordered with ferruginous; a narrow reddish line at the base of the fringe. Posterior wings above ochreous; an obtuse angle at the termination of the third median nervule, between which and the anal angle, the margin is concave and bordered with dark brown; the anal angle slightly violaceous; a ferruginous line commencing on the abdominal margin (where it is almost black) a short distance above the anal angle, extending about three quarters of the distance across the wings, gradually becoming fainter and lost in the ground color; posterior wings free from striae except near the anal angle. Wings beneath, ochreous; pale near the base; profusely striated with ferruginous, especially on the posteriors; anterior wings with a broad ferruginous line, slightly violaceous, prominent on the costal margin, corresponding to the upper part of the line above; this line is obliterated before the inner margin; a broad whitish border along the inner margin, free from markings; posterior wings with a broad violet border, bounded interiorly by a ferruginous line composed of accumulated striae.

Hab., New York. Collection of H. K. Morrison.

This handsome species can be easily distinguished from phlogosaria *Guenée*, and alcoolaria *Guenée*, by the different number and arrangement of the lines on the anteriors above; from fervidaria *Herr.-Sch.* (*emargataria*, Guen.), it differs by the strongly marked indentation and prominent angle of the outer margin of the anterior wings. There are also other minor points of difference between the species, which can be seen from the descriptions.

XVIII. On Eight Species of Noctuidae

BY AUG. R. GROTE.

[*Read before this Society, November* 21, 1873.]

1. Hadena sputator, *Grote.*

Apamea? insignata, Walker p. 729 (n. b. l.).

♂ ♀.—I have formerly united this form with Hadena dubitans. *Grote* (*Mamestra dubitans*, Walker, p. 232), but a large series of specimens induce me to separate it as distinct. The present form must receive a new name, since that of *insignata* is used for a species, which is most probably a Hadena, on page 727, by Mr. Walker himself, while the name had also been previously used in the group. This is the more usual species of the two (found under bark with H. devastator) and has been sent me in number by Mr. J. A. Pettit, from Grimsby, Canada. New York specimens have been sent me by Mr. Mead, under the Number 95. I have taken it also in the vicinity of Buffalo in August. It is the smaller (42 to 44 m. m.) form; the fore wings blackish aeneous brown, and the markings almost entirely lost: the most prominent feature of the primaries is the contrasting pale powdery squamation of the reniform spot. Occasionally the orbicular is dusted with similar pale scales, which also relieve outwardly and narrowly the subterminal line which is preceded by impromінent blackish unequal cuneiform marks. My former determination of H. dubitans, *h. s.*, p. 142, needs no rectification. Hadena dubitans is the larger (48 to 50 m. m.) form of the two, and I have it from the Middle States and California. It is of a light smooth ferruginous brown, a little darker on the costal region and terminal space. The transverse posterior line is merely indicated by dots on the veins. In Hadena sputator, this line is seen in fresh specimens to be indicated by a pale shading between geminate dark lines. The spots are, in H. dubitans, also, more or less notably powdered with pale scales, but on account of the paler color of the wings these do not so prominently contrast. The hind wings are brownish fuscous, not blackish fuscous, as in

H. sputator. The thorax is brown, concolorous with the wings, without marks; beneath, similar to H. sputator, but the color is everywhere light brown, not blackish brown. Both species are undoubtedly typical Hadenas, and very closely allied. Mr. Walker's generic references are therefore inexplicable, while neither species can be recognized with certainty by the descriptions in the British Museum Lists. The form described above under a necessarily new name bears a resemblance to the European *Alopecurus*, Engramelle, fig. 373, *b*, not *a;* I have, however, both sexes of our American species, corresponding with each other in color. On the other hand Hadena dubitans resembles, but more distantly, Engramelle's fig. 373, *a*. The typical Hadena rurea, is represented in the collection of this Society by a New York specimen.

2. Ipimorpha pleonectusa, *Grote.*

♂.—This species is allied to the European *subtusa*. It differs by its larger size and different tint. Instead of olivaceous, it has a faded, dusky, warm testaceous hue. The ornamentation is similar, but the claviform spot is proportionally larger in the American species, in which it equals the orbicular. The subterminal line differs by being outwardly pale-lined, and notably more jagged and distinct than in the European congener. Beneath, the usual lines are not perceptible. A longer description is not necessary; the different tone of the delicate evenly diffused tint of the nearly concolorous species (with its even pale median lines, and large pale-circled concolorous ordinary spots), its larger size and the differences in the markings detailed above, easily separating it from the European *subtusa*, with which it coincides in the shape of the wings and the presence of the claviform spot, the latter absent in *retusa*.

Expanse, 33 m. m.

Habitat, Sharon Springs, New York (O Meske, 3476).

3. Scopelosoma sidus, *Guenée.*

Dichagramma vinulenta, Grote, Proc. Ent. Soc. Phil., 1864.

Habitat. Texas (Cresson); New York (Lintner).

Varies in the color of the reniform spot, which is sometimes white (as I have described it), sometimes fulvous (as Guenée describes it).

The European *satellitia*, varies in a similar manner. Our species seems to be more intensely colored than the European, but otherwise resembles it closely.

4. Scopelosoma Walkeri.

Phlagramma Walkeri, Grote, Proc. Ent. Soc. Phil., 1864.

Habitat, Canada (Pettit); New York; Buffalo (coll. of this Society). On account of the long and narrow primaries, with uneven fringes and external margin, I refer this species as congeneric with S. sidus, differing in these characters from Cerastis. The ♀ moth has been taken in this vicinity in March, during cold weather (about maple trees, sucking the sap), by my friend David F. Day, Esq. The specimens were in good condition but had evidently hybernated. Lederer remarks that the hybernating specimens of Cerastis and Scopelosoma noticed by him were all females. The reniform varies as in *sidus*, being sometimes white, again ochreous, usually less distinct than in *sidus*, but again specimens occur, in which the two accompanying white dots are readily perceivable. In its dusky and ochreous colors this species is very different from *sidus*. The median shade in *Walkeri*, is straighter, below the reniform, than in *satellitia*, where it is waved, and the obsolete denticulate transverse posterior line is also a little straighter in its general course. In general color *Walkeri* varies from ochreous to dusky olivaceous brown, while the other two species are rich reddish or purplish brown, and so, much deeper and more intensely colored. The marginal pale points in *satellitia*, following the finely waved terminal line, are not perceivable in *Walkeri*, which is the more roughly scaled species.

5. Plusia Putnami, *Grote*, Plate 4, fig. 2 ♂.

I have, since describing this species, received from Europe the true *festucae*, corresponding with Engramelle's figures, 585 *a–f*, and I find that the North American species I have used for comparison with *Putnami*, is distinct from *festucae*. *Plusia Putnami*, differs from the European *festucae*, in the much smaller aureate median spots and the different shape and upward extension of the first of these, and in the more rosy fore wings which want the dark ground color and discol-

oration of the median space superiorly which distinguishes *festucae*. The course of the transverse lines remains much the same in the two species, while in the American species they are much more tinted with vivid orange red at the base of the primaries. Beneath, in my specimen, the lines are very faint; I think there may be two on the hind wings. The species I have considered hitherto as *festucae*, seems to me undescribed. Guenée says of *festucae:* "Jái vu un individu de l' Amérique du nord qui ne diffère en rien des nôtres." This, it seems to me, could not have been said of *Putnami*. Mr. Walker, also, records *festucae* from North America.

The description on p. 146 should be amended and read as follows:

♂.—Golden yellow, the base of the fore wings powdered with orange red scales, and with the linear transverse shades traced in orange red basally and towards internal margin. Beyond the t. a line the region about internal margin is washed with pale golden as in *festucae*, irrorate with orange red scales. The angulate median shade and all the lines have apparently the same general course as in *festucae*. There are two median metallic spots, smaller than in *festucae*, black ringed, the inner and slightly larger one with an upward extension into the discal cell. The wing has a pale rosy ground color, not dark as in *festucae*. A black dot above vein 6 at its base, the indication of the reniform. The metallic portion of the apical golden shade is limited to a bordering of the apical streak, not so uniformly spreading to the costa as in *festucae*. Hind wings, pale fuscous. Thorax and head rosy; collar with a lilac edge. Beneath, pale ochrey, with faint transverse lines.

6. Plusia contexta, *Grote.*

♂.—Fore wings a little narrower than in *festucae* or *Putnami*, external margin a little straighter, of the same brilliant colors, but the ground tint is more as in *festucae*, more of a livid brown, not rosy as in *Putnami*. The course of the median lines is the same as in its allies, but they are hardly as distinct. The light golden metallic spots are fused, so that they come to have somewhat the appearance of the spots in *biloba;* the base of the compound spot is straight; the upper margin of the spot does not extend above the median vein. The golden portion of the apical shade is more extended inwardly and superiorily than in either of its allies, reaching inwardly to the reniform dot. Fringes of both wings pinkish. Hind wings pale fuscous; beneath, both wings pale rosy or ochrey fuscous, with faint transverse lines. Varies in the extent of the orange red powdering of the wings, so that some specimens seem higher colored than others.

Expanse, 34 m. m. · *Habitat*, New York; Albany (Lintner).

7. Plusia striatella, *Grote.*

♂.—A little smaller than *contexta*, of the same form, external margin of primaries seeming straighter, apices less produced. On the fore wings the transverse lines are obsolete. The ornamentation reminds one of Leucania, and consists of darker longitudinal streaks on a pinkish ground. Costa, basally, and internal margin throughout its length, narrowly golden. The larger inferior portion of the fore wing below median vein, from the base outwardly, is deep ochreous brown. This dark color is cleanly cut by a narrow golden streak, neatly black margined, which takes the place of the ordinary spots and extends along the sub-median interspace from within basal third to external margin. A second golden shade streak opposite the cell, and here margining superiorly the darker portion of the wing. No dark apical shade as in *festucae*, *Putnami* and *contexta*. The second longitudinal golden streak opposite the cell appears to replace the apical shade in those species; it differs here by being continuous nearly to the margin, while the darker oblique shadings are absent in *striatella*. Fringes pink on both wings, with fine basal line. Hind wings fuscous, much as in allied species. Beneath, rosy; primaries, dusky fuscous centrally; hind wings with no apparent transverse line. Thorax and head rosy yellow; collar with lilac edges.

Expanse, 32 m. m. *Habitat*. Washington (Glover, MS. Plate 84, fig. 22); New York (Lintner); Canada (Saunders).

8. Mamestra claviplena, *Grote.*

♂ ♀.—Eyes hairy; tibiae all unarmed. Antennae (♂) shortly pectinate, ciliate beneath, the pectinations furnished with longer lateral spinules. Size moderate; wood or umber brown, the lines indicated by paler included shades; median spots large, with distinct darker annuli inwardly pale-edged and with diffuse dark centers, the reniform with a nearly obsolete white streak. Claviform large, triangulate, prominent, almost sometimes blackish—the most noticeable ornamentation of the wing; median space rather narrow; transverse posterior line incepted above reniform from a prominent costal pale mark, dentate on the veins, inwardly lunulate between them; the inward lunulation is extended on cell 2 and the line again outwardly pointed on the subterminal nervure. Veins darkly streaked opposite the points of the t. p. line; subterminal line pale, tolerably distinct and continued; W-mark obsolete; a distinct dark terminal line regularly interrupted by pale dots at the extremity of the veins where also the dark fringes are undecidedly cut with pale color. Hind wings and abdomen brownish fuscous, concolorous; basal portion of the secondaries hardly paler and these are without lines; beneath dusted with pale scales, with faint transverse line and dot. Abdomen with slight dorsal segmentary tufts. Thorax with a central tuft behind the collar.

Expanse, 30 m. m. *Habitat*. Albany (Lintner. No. 2,288 ♂; No. 2,287 ♀). Allied to the European M. Treitschkei.

XIX. The two Principal Groups of Urbicolae (Hesperidae auct.)

BY SAMUEL H. SCUDDER.

[*Read before this Society, December* 19, 1873.]

THE classification of the Urbicolae (Hesperidae auct.) has proved a stumbling-block to all who have proposed any arrangement of butterflies. No author, Hübner excepted, has even attempted more than a generic collocation, and the two most recent essays of this sort have been exceedingly unsatisfactory. In his Verzeichniss, Hübner divided the "stirps" into eight "families;" the first three of these are founded mainly on the form of the wings, the others simply on their markings; these divisions are almost wholly unnatural, although the sequence of the genera is far more reasonable than that of Herrich-Schaeffer or Butler.

Fabricius was the first to separate the family into distinct genera. In Illiger's Magazine he divided it into three genera—Thymele, Helias and Pamphila. Helias was founded upon a single, undescribed and now unknown species. If we omit Helias, the genera Thymele and Pamphila will represent in the main* the natural separation of the Urbicolae into two grand divisions, which are of less value than sub-families, and may therefore be termed tribes; to the former we may apply the name *Hesperides*, which Latreille gave in 1807 to the whole family, since it includes the genus Hesperia; while the other may retain Hübner's name *Astyci* (1816), formerly intended for the whole group.

The following distinctions will be found between the two tribes:

In the Hesperides, the fore wing of the male is always provided with a costal fold where a sort of silky down is concealed; this feature is often very inconspicuous; in the Astyci, on the other hand, the male is generally furnished with a discal patch of peculiar scales crossing the median interspaces of the fore wings, usually in an oblique direction; but sometimes the wing of the male is as simple as that of the female. In the male Hesperides again, the

* Some species enumerated under Pamphila belong to the first division.

posterior extremity of the alimentary canal is protected beneath by a corneous sheath, which extends beyond the centrum or body of the upper pair of abdominal appendages, sometimes nearly to the extremity of the appendages, carrying the vent beyond the centrum; while in the Astyci, the extremity of the canal is not protected by any extruded sheath, but opens at the very base of the inferior wall of the centrum.

In the Hesperides, the prevailing color of the butterflies is dark brown, marked with white or translucent angular spots; the antennae generally have a long club roundly bent or with a sinuous lateral curve; in the Astyci the prevailing tints of the wings are tawny and black, marked also, but often feebly, with pale, sometimes vitreous spots; the antennae are provided with a stout club, which generally tapers rapidly and terminates in a slender prolongation, recurved at about a right angle; but in a few genera the crook is very slight, or wholly wanting.

The body of the Hesperides is proportionally stouter than in the Astyci, and their flight is generally swifter and more direct, although in some genera the movement is unusually slow. In the higher Hesperides, when the insect is at rest, all the wings are held equally erect; in the lower groups, the wings are either perfectly or almost perfectly expanded, or else they present the inequality of position characteristic of the Astyci, where the hind wings are usually horizontal or partially raised, while the fore wings are vertical, or at least more elevated than the others.

The earlier stages seem to present no peculiar distinctions, if we except the eggs; in the Hesperides these are always distinctly ribbed vertically, and are almost always taller than broad; while in the Astyci the eggs are smooth and pretty regularly hemispherical, usually broader than high. The caterpillars of Hesperides generally feed upon leguminous plants, and live in horizontal nests made of leaves; the Astyci feed on Gramineae, and generally construct vertical nests among the blades.

To the former group—Hesperides—belong such genera as Pyrrhopyga, Erycides, Thymele, Thorybes, Achylodes, Erynnis and Hesperia. To the latter—Astyci—Ancyloxypha, Thymelicus, Cyclopides, Atrytone, Pamphila, Augiades, Limochores, Prenes, Calpodes and Lerema.

XX. Note on the species of Glaucopsyche from Eastern North America

BY SAMUEL H. SCUDDER.

[*Read before this Society, December* 26, 1873.]

Mr. Grote has recently published in this Bulletin a description of a species of Glaucopsyche, of which many specimens were collected in Anticosti by Mr. Couper, and to which Mr. Grote gave the name of G. Couperi. The description was based upon nine specimens which, strange to say, included only one male; all, excepting one female, were more or less rubbed and their determination was a matter of no small difficulty. Mr. Grote was good enough to submit the specimens to my inspection before (and again since) description, and it is but fair to him to say that it was, at least in part, owing to my report, that they were described as distinct from what has ordinarily been known in American collections as Lycaena Pembina *Edw.* The single male seemed to have as broad and vaguely defined a dusky border to the outer margin of the wings, as the female; while in the previously known species, the upper surface of the wings of the male had a distinct and very narrow black edging. Since its description, however, I have seen in different collections thirty or forty good specimens collected by Couper at the same time, and no male with markings resembling those of the female occurs among them; this throws very strong doubt upon the validity of the distinction and a reëxamination of the types is not reassuring, for the wings of the male are rubbed so that it is impossible to assert positively that their border was any broader or less well defined than in those specimens from which it was believed to be specifically distinct, although its appearance tends to the earlier conclusion. On the whole, therefore, I am inclined now to consider all the northern specimens of Glaucopsyche as belonging to a single species.

The name Couperi will nevertheless stand for this species; for Mr. Edwards has recently called my attention to the fact that in describing Pembina he stated it to be allied to the Californian Pheres *Boisd.*, while *in the same connection* he described a Californian butterfly (*Behrii*) as belonging to a distinct series of which Lygdamus *Doubl.*, was the type. The insect, therefore, which we have been calling Pembina cannot be that species, and hence this northern Glaucopsyche was described for the first time by Mr. Grote. What the true Pembina is, remains to be determined.

The southern Glaucopsyche, called Lygdamus by Doubleday, is probably distinct from Couperi. I have not yet detected any differences in the abdominal appendages of the males, but that is hardly to be expected, since in these parts the distinction between closely allied species in the Ephori is always exceedingly slight; southern specimens of Glaucopsyche, however, differ from the northern, in having a more glossy reflection of the upper-surface in the males, a narrower dusky border of the same in the females, and, in both sexes, a paler tint on the under-surface, and a tendency to much larger spots, in which the black central portion predominates.

A specimen of this species in my collection (from Kanawha Co., W. Va.) has the right fore wing longitudinally crumpled in a slight degree, the fold passing along the middle of the cell; beneath, a little before the extremity of the cell, and also a little before the second sub-marginal spot, is a small roundish black spot, almost wholly overlaid by a powdering of *blue* scales, of the color of the upper-surface, as if there were a partial inversion of the upper-surface, caused by the fold.

The synonymy of these species will stand as follows:

1. **Glaucopsyche Lygdamus** *Scudd.*, Rev. Am. Butt., 33.

   Lycaena Lygdamus Doubl. Entom., 209.
   Cupido Lygdamus Kirby, Syn. Cat. Lep., 365.
   ? Lycaena Antiacis Boisd., Ann. Soc. Ent. France, 1852, 300.

2. **Glaucopsyche Couperi** *Grote*, Bul. Buf. Soc. Nat. Sci., I, p. 185 (printed Nov. 5, 1873).

   Lycaena Pembina Edw., Syn. N. Am. Butt., 37.
   Glaucopsyche Pembina Scudd., Rev. Am. Butt., 34 [not Lycaena Pembina *Edw.*, Proc. Acad. Nat. Sci. Philad., 1862, 224].

XXI. On a New Species of Grammysia from the Chemung Group

BY WILLIAM H. PITT.

[*Read before this Society, December* 26, 1873.]

Genus **Grammysia,** *De Verneuil,*
Bulletin de la Soc. Geol. de France, Vol. 4, p. 696, 1847.

M. DE VERNEUIL's generic description has been lately modified by Professor James Hall, so as to include the species which naturally belong to the same group, as follows:

Generic Characters.—Shell equivalve, inequilateral, varying from subquadrate to transversely elliptical. Valves ventricose, sometimes inflated: beaks strong, prominent and incurved; hinge line shorter than the shell, posterior to the beaks. Dentition obscure, or represented only by irregular folds on the cardinal line: ligament external, prominent, extending from beneath the beaks to nearly one-half the length of the hinge line. Cardinal margin bordered by a deep, well-marked escutcheon; anterior end marked by a small, deep and strongly defined lunule. Anterior and posterior muscular impressions faintly marked, the latter much the larger: palleal line not sinuate, but broken into points or ridges, strongly rounded posteriorly, and uniting with the large muscular scar near its anterior border.

Surface of shell often marked by an oblique mesial rib or fold, extending from the beak to the basal border, and by numerous strong concentric folds or ridges, which are frequently obsolete on the posterior part of the shell. The shells appear to have been thin and fragile, and are usually much crushed and distorted from compression; but most of the species occurring in the New York rocks are well marked, and not readily mistaken, since their specific characters are easily distinguished.

Notice of Lamellibranchiate Shells, Part 2, *p.* 48 [*preparatory for the Paleontology of New York*].

Grammysia Chemungensis (n. s.), Plate 6.

Shell attaining medium size, and, transversely, decidedly elliptical; valves ventricose; beaks strong, incurved, and somewhat flattened; hinge line (as near as can be determined from the specimen, which is a cast, left valve) less

than half the length of the shell, and barely arcuate. Anterior end somewhat narrow and short; beneath the beaks, which are close to the anterior end, is a very small, but strongly marked, lunule; the margin here is broadly rounded into the basal border, which is regularly curved except where the oblique fold or rib terminates. The posterior margin is sharply rounded, prolonged, and slightly oblique to the transverse axis. Surface ornamented with concentric striae and undulations of growth, parallel with the margin, which are strongly marked on the anterior end and umbo, but disappear on the posterior slope and cardinal region. There are traces also of an oblique middle fold or rib, extending from the beak to the basal margin, considerably behind the middle of the valve. This fold or rib is not deeply marked in the specimen figured across the entire valve, but its termination on the margin shows plainly a protrusion and the two adjacent depressions or furrows.

The species resembles Grammysia Elliptica, but the valves are very ventricose, the umbo unlike Elliptica, and in other characteristics quite different.

Formation and Location: Chemung Group, Belvidere, Allegany Co., N. Y.

The great depth and position of the rocks in this group, extending as they do over the southern tier of counties of New York, southward in Pennsylvania, and along the Appalachian region, make them of more than ordinary interest.

They consist mostly of shale and intervening sandstone, in which the shale greatly predominates.

In no part of the group is there a greater abundance of fossils or variety of species to be found than between the Genesee and Alleghany rivers, over an area some thirty miles in width from the Pennsylvania line. The Genesee at Belvidere is about 1,700 feet above tide water, while the hills which lie to the south and southwest reach an altitude of 800 or 1,000 feet above the flood plain of the river. The lower strata, as exposed in the deep ravines and along the natural water-courses of streams tributaries to this river, are found in many places to be wonderfully fossiliferous; nor is it only at the base, but on the tops of the elevations, wherever the shale or sandstone come to the surface, that both brachiopoda and lamellibranchiata occur.

At Belvidere, on Van Campen's creek, is a layer of grayish sandstone, about two feet thick, in which the Grammysia Chemungensis was found; and so full is this rock of shells, that scarcely a square inch of it can be exposed without disclosing some specimen.

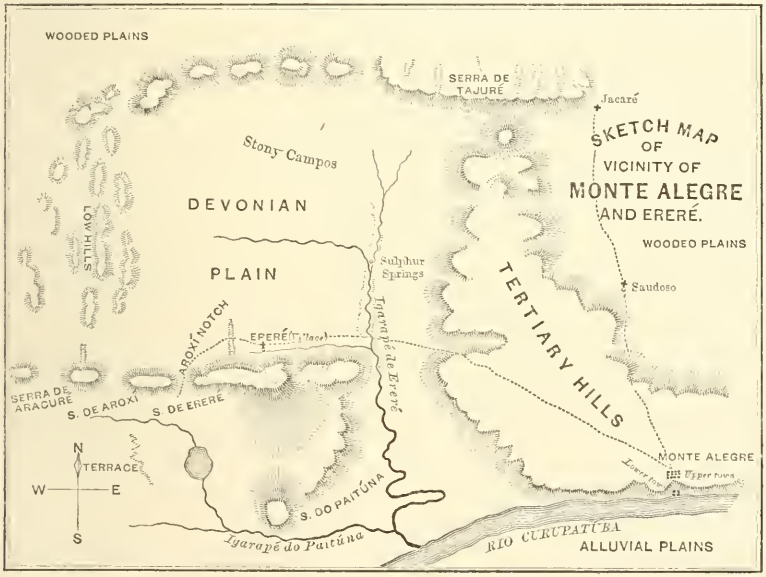
XXII. Contributions to the Geology and Physical Geography of the Lower Amazonas

BY CH. FRED. HARTT,

Prof. of Geology in Cornell University.

[*Read before this Society, January* 2, 1874.]

THE ERERÉ-MONTE-ALEGRE DISTRICT AND THE TABLE-TOPPED HILLS.



Ascending the Amazonas from Pará, the topographical features observable from the river for the first 300 miles, are very monotonous. With the exception of the immediate vicinity of Pará, Breves and Gurupá, where the land rises to a height of twenty to thirty feet above tide-level, the country is perfectly flat, scarcely above water even in the dry season, and of recent origin. Where

the land is perennially wet, as along the *furos** connecting the main river and the Pará estuary, it is so densely forest-clothed that, from the water, one sees nothing but foliage, and the land-effect is produced not by *terra firma*, but by the forest-wall that at once borders and limits the channels.

Were the vegetation removed from the region just mentioned, the vision of the traveler, instead of being shut in everywhere by the forest, would range over a tract as level as the sea. Enormous mud flats, partially covered by every tide, nowhere more than a very few feet out of water, traversed by a network of deep channels, and diversified by lakes, would be seen stretching away to the horizon on every side, only here and there a *torrão*, like that of Breves, rising above the general dead level. Such would be the appearance of the Breves district during the dry season if deprived of trees; but, during the rains, the Amazonas deluges the whole region and pours over it in one broad sheet into the bay of Marajó. To rightly appreciate the topography of the lower Amazonas, we must eliminate the effect produced upon us by the vegetation. True it is that the alluvial lands, just described, depend upon the forest both for their origin and existence, but one is apt to mistake forest topography, if I may use such a term, for land topography, and count for more than its real geographical value, a district whose height and limits are intensified or defined by forest. After having made six voyages between the bay of Marajó and the main river, I am satisfied that, one reason why voyagers have so much doubted whether the, so called, Pará river should be considered a mouth of the Amazonas, is largely due to the fact, that the forest prevents a just appreciation of the magnitude of the united channels of the Breves district, while, at the same time, the size of the Tocantins has been much over-estimated. Above Trocará this river is, during the dry months, only a small, narrow stream, while, in the lower course, it is not a true river, but a wide, extremely shallow, tidal estuary, the upper part of which is in process of filling up with sand, brought down by the river. The enormously wide, lower reaches, that open broadly into the bay of Marajo, are swept by very strong tides, and are being silted up by Amazonian mud. Travelers who hastily pass through

* A *furo* on the Amazonas is a channel that connects two different streams and it differs from a paraná-merím, which is a side channel that leaves a river and joins it again lower down.

the Breves district, and trust to maps and the glimpses they get of the mouth of the Tocantins, may set down the Pará as simply the extension of that river, but they are not correct. The Tapajos and Tocantins are rivers of very nearly the same size, but the waters of the former river, on issuing from its mouth, are crowded by the mighty torrent of the Amazonas against its bank, as if they were a mere brook. To attribute the fresh waters of the Pará to the Tocantins, is like referring a giant's work to a pigmy. The Tocantins, Mojú, Acará and all the true rivers emptying into the Pará, taken together, would not, during the dry season, furnish enough water to make more than a respectable Amazonian paraná-merím, and they would be utterly insignificant, in comparison with the united Breves furos. Of course the rivers just enumerated must be enormously increased in volume during flood time, but even at that time they cannot compare with the wide Amazonian flood which then pours through channel and forest over the Breves lowlands.

It must not be forgotten that these lowlands are bordered on the east by the higher lands of Marajó and on the south-west by those of the southern side of the Amazonian valley, and the traveler on the lower Amazonas should remember that the flat, alluvial banks, which so monotonously accompany the river, do not extend very far into the interior. If we ascend the Tocantins, we shall encounter the higher grounds at Cametá, and the town of Gurupá is built on, what appears to be a low spur of these same lands. They reappear again at the mouth of the Xingú, to the westward of which, at a greater or less distance from the river, they stretch in a line of bluffs to the Tapajos.

Ascending the Amazonas by the ordinary route, one sees no high lands on the northern side of the river, until, having passed the mouth of the Xingú, the table-topped serras of Parú rise before one, stretching along the river in patches nearly to Praïnha, beyond which soon come into view the highlands of the Monte-Alegre district. It is to the Geology and Physical Geography of these northern Highlands and their vicinity that I now invite the attention of the reader.

The villa of Monte-Alegre is situated a few miles above the mouth of the rio Curupatúba,* one of the northern affluents of the Ama-

* From the Lingoa geral *Kurupá*, a port, and *tŷ'ua*, a place of. The name appears to have been primarily applied to the village, because of its convenient landing place. Rio Curupatúba

zonas, and is distant 350–360 miles nearly directly west of the city of Belém or Pará.

On the maps, the Curupatúba is usually represented as a large river, taking its rise in the highlands of Guiana, to the north-westward of Monte-Alegre, and which, shortly before entering the Amazonas, receives by a short outlet the waters of a large lake. According to Sr. Ferreira Penna* this is inexact. The river that descends from the interior is called the Mãecurú † (or Maycurú) and it empties directly into the lake. This river has never been explored and nothing is known of its upper course. The lower part is bordered by rich grazing grounds and is inhabited. The lake, commonly known as the Lago Grande de Monte-Alegre and celebrated for its fishery of the *pirarucú* (*Sudis grandis*) is situated in the allúvial bottom about midway between Monte-Alegre and Santarem, and to the south-west of the former villa. Sr. Penna says that it is about twenty-five miles long, and from three to five in width. It is most probably an old channel of the Amazonas. The same author states that the lake empties by two channels which soon unite in one called the *Cururuhy'*.‡ This presently receives on the left the Igarapé-apára,§ when the stream takes the name Curupatúba. The course of the latter is at first north or north-east, but, just before reaching the villa of Monte-Alegre, it makes a bend to the east, and, hugging the higher lands on the northern side of the valley, empties into the Amazonas, a few miles east of Monte-Alegre, just below which town, it communicates with the main river by a navigable *paraná-merím*.‖ It is interesting to observe that the Amazonas runs obliquely across the valley, in a north-easterly direction, from the highlands, a few miles east of Santarem, to those of Monte-Alegre, leaving a very broad strip of alluvial campos on the northern side, which narrows towards the east, running out near the

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then corresponds to Rio de Monte-Alegre, which one sometimes hears used. On some maps we find the spelling, Gurupatúba. Gurupá, the name of a little town a few hours east of the mouth of the Xingú, is a corruption of *Kurupá*.

* A Região occidental da Prov. do Pará, p. 125.

† From the reports of the vaqueiros and some fragments of a fine sharp sandstone I have seen, I am led to believe that the geology of the river would prove interesting.

‡ Toad river, from *Kururú*, a toad, and *y'g*, water or river.

§ *Apára* means crooked.

‖ More properly a *furo* or cross-cut.

mouth of the Curupatúba; these plains having been formed by the growth and fusion of islands in the silting up of the valley.

The villa of Monte-Alegre*. is divided into two parts, the upper or principal town, and the lower town or port. The latter is situated on the left bank of the river, while the upper town, distant about a mile to the north, and reached by a steep, weary, sandy ascent, is built on the edge of a high, broad, flattened ridge or plateau, extending northward from the river to the serra of Tauajurí, distant some eighteen miles.†

This ridge, which has a height of five or six hundred feet, more or less, is composed of horizontal beds of clays and sands, of probable Tertiary age, and is, as I suppose, a degraded outlier of the once extensive formation of the Serras de Parú. On top it is very flat, but the surface is gently rounded, descending to the plains, both to the east and west, by gradual slopes, abrupt descents being infrequent, except on the southern side, which, having been encroached upon by the Amazonas, is steep, sometimes precipitous along the base, and gullied by many ravines.

The upper town of Monte-Alegre is composed of some fifty, for the most part shabby, tumble-down houses and vendas, together with a handsome new church and a curious, little, old, barn-like chapel, surrounding an immense, shadeless, sandy, Sahara of a square. The inhabitants are principally of Indian descent, but among the white families there are a few of education and refinement. The town has been ruined by the rubber trade, and is fast going to decay. The people are chiefly engaged in grazing, fishing and trade.

From the villa there is a magnificent view over the Amazonian valley. Below is the Curupatúba, which one may trace far to the south-westward, winding, tree-fringed, over the verdant, grassy, alluvial plain, which, level as the sea and variegated by forest patches and mirror-like lagoons, stretches southward for miles to the turbid flood of the mighty river, while away beyond in the south-west, are

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* Happy mount. The name sounds strangely to the traveler who has enjoyed its delectable nights, the cheerful serenades of its *carapanãs* and the moon worship of its numerous canine population!

† I regret very much that I shall be obliged to estimate all the distances given in this paper, and that I can furnish nothing more than a rough sketch-map of the district examined. The region has never been surveyed and mapped, and I have hence labored under a very great disadvantage. All my work on land was done on foot, many days often being spent in a fruitless search for rock exposures.

the white cliffs of Cuçary, and the blue, level highlands of the vicinity of Santarem. Seen from Monte-Alegre, the Amazonas does not resemble a river. It comes mysteriously from the west, stretches a broad, reddish belt across the landscape, and disappears in the east, with a wide water-horizon, as if, an arm of the sea, it opened out to the ocean. When the annual flood comes, all the green campos and clear-water lakes are whelmed beneath the turbid current, and even from the heights of Monte-Alegre, the southern shore is but dimly discernible. No wonder that the Indian fisherman calls it *paraná*, the sea! Looking westward from the village, one sees distinctly the high, rocky, irregularly flat-topped serra of Paitúna, with a curious mushroom-like pillar standing on its southern extremity, and called the mão de pilão, or *Indúá ména*. A few miles to the north, is the rugged serra of Ereré, breaking down precipitously towards the north. From the top of the ridge behind the town, the beautiful serra of Tanajuré comes into view, while, to the eastward, lie broad plains and campos, with the level-topped mass of Paranáquára lying low down on the horizon. After this reconnoissance of the region we are to explore, let us descend to the lower town and go by water to Ereré.

The descent to the river is at first down a long, sandy incline, showing very few exposures, but the upper part, which is very steep, appears to be composed of reddish, clayey sands, much cut up by rain-courses, the clay being washed out and carried away, while the coarse sand is left lying loose on the surface, supporting a sparse vegetation, consisting mainly of small trees and shrubs, with here and there a giant cactus, cajú trees (*Anacardium occidentale*) being abundant, as we shall find them elsewhere on similar ground. Following the sandy path, and directing our steps to the ravine leading to the lower town, we presently reach a sort of terrace that runs out into a high, bluff, projecting point, extending to the river side just west of the village. This point is formed by a heavy bed of more or less sandy, and variegated feldspathic clay, which, tougher than the overlying beds, has resisted denudation. A little stream of water issuing from above the clay, falls into a ravine, that extends down to the river, and in a steep bank by the side of the road near where the inhabitants resort for water, the clays are well exposed. They vary in character from a pure feldspathic

tabatinga to a clayey sand, and are usually more or less deeply tinted, some of the layers being of a rich, purplish red. This bed of clay appears to be the lowest member of the formation of the ridge of Monte-Alegre. If we descend the ravine cut by the above stream, we presently strike a sloping, fan-shaped deposit of loose, white sand occupying the mouth of the ravine and forming a praia or beach along the river. On this sand, the lower town, consisting of a few houses and stores, is built. It is not a flourishing place; everything speaks of decay, and but little business is done in it. I found the people, however, very hospitable, and Senhor Onetti and his partner did everything in their power to aid me. In Mr. Rathbun's paper, annexed, I shall have an opportunity of recognizing the kindness of Sr. Valente, of the upper town.

Ascending the Curupatúba in a montaria, we find the stream to have a width of 400–500 feet,* and a depth during the dry season of 7–8 fathoms, the current of course varying with the season.

The bluffs, 60–100 feet in height, and covered with woods undergrown with curuá palms, continue for a short distance above the town, where they cease, and the highlands trend away from the river. The southern side of the ridge is high, abrupt, and with a steep slope. In the valley of Surubijú,† just west of the town, are swampy grounds, supporting a luxuriant forest with mirití ‡ (*Mauritia flexuosa*) and assaí § palms (*Euterpe oleracea*), but the vegetation of the sandy slope is very meagre. In the valley is an isolated hill, on which beds of a white, sandy tabatinga are exposed, and near by, were obtained the irregular, concretionary masses of iron-stone, used in building the new church in the upper village.

On the opposite side of the Curupatúba are the alluvial campos of the river-bottom, covered with coarse grasses and bordered along the water's edge by a thin line of trees. We soon leave the Curupatúba, which bends round to the south-westward, and enter the igarapé de Paitúna, a little river, that flows eastward past the

* 260 metres, Penna.

† Von Martius derives this name from *Sorubim* (*Platystoma*, a genus of fishes) and *y'g*, water, or river. Glossarios, p. 475.

‡ *Ymyrá*, tree, *eté*, true. *Ymyrá* was originally *ymbyrá*, whence the form *buriti* (Port) used in Eastern Brazil.

§ *Uasai*, lingoa geral, very likely from *yuá* fruit, and *sé* or *seé*, sweet.

serra of the same name, and which, like all the streams of the alluvial bottom of the Amazonas, has a deep, narrow channel, with very steep, muddy banks. In the dry season, the water of the igarapé is almost stagnant, simply rising and falling with the tide, and the stream literally swarms with alligators of large size. Porpoises gambol in its waters, and its banks abound in game, nacará and manarí cranes, piasócas, corta-agoas, alencórnos and other birds being exceedingly common. Capibáras are also very abundant in the vicinity.

After following the Paitúna for some distance, we turn off northward into a still smaller stream, called the igarapé de Ereré, and now enter a sort of alluvial bay, bounded by the Monte-Alegre plateau on one side, and on the other by the serra of Paitúna and the swelling sandy highlands stretching thence to, and east of, the serra of Ereré.

The little igarapé is exceedingly tortuous, bending hither and thither in a manner most bewildering to the voyager. Its banks are in part open river bottom, in part margined by a thin line of small trees, palms, as Prof. Agassiz has already remarked, being rare. The water of the stream is very turbid during the dry season, and the narrow channel is often interrupted by floating balsas of *cannarána*. As one ascends the igarapé the valley grows narrower, and at the cattle-fazenda of Sta. Maria, the higher lands of this Ereré plateau come down to the stream, and, in a bluff, obliquely laminated beds of tinted sands and clays are exposed. The alluvial campos of the lower course of the igarapé de Ereré and of the vicinity of Monte-Alegre, are used during the dry season as a pasturage for cattle, and there are several *currães* along the route we have just followed. Cattle raising is indeed the chief branch of industry followed in this part of the Amazonas. The lands in the Ereré—Monte-Alegre district—are for the most part unfit for cultivation, and agriculture is practiced on a very small scale. The proprietor of the fazenda of Sta. Maria informed me that the saúba ant (*Oecodoma*) was so very abundant on his farm that it was next to impossible to raise a crop. It was even necessary to place the house plants upon a staging erected over the igarapé to protect them, and there they were not always safe.

On the left bank of the stream, above the fazenda, begins a very extensive and beautiful grove of *miritî* palms, which occupies a marshy tract, that seems to be quite dry during several months of the year. A little farther on we meet with higher lands on the left bank, and on the same side, between the upper and lower ports of the village of Ereré, there is a narrow ridge of sandstone, rising about twenty feet above the general level of the campos, and which runs off eastward, perpendicular to the river. This ridge is very much broken, the sandstone lying in huge masses, overgrown with trees and spiny shrubbery, so that I found it very difficult to examine it, and I could not satisfactorily determine the direction of the strata. The rock is, for the most part, a very hard sandstone with a clayey cement, but some of the beds are very argillaceous and beautifully striped with brilliant colors.

We have now emerged from a sort of pass between the Ereré and Monte-Alegre highlands, and have entered a vast, low plain, surrounded by hills and high ground on all sides. From north to south this plain probably measures not less than fifteen miles, while its width from east to west must be over ten miles. It lies a little higher than the alluvial plains of the Amazonas, and is drained by the igarapé by which we have just ascended. It is composed of nearly horizontal strata of Devonian age, through which the igarapé has cut a little valley, now partially filled in with alluvial deposits, lying at a lower level than the plain, the Devonian strata forming low bluffs bordering them. The valley narrows to the northward, and, in the upper part, the igarapé flows directly through, and over the Devonian rocks, a clear water stream.

In a little bluff by the side of the road leading from the igarapé to Ereré, and just as one ascends from the alluvial flat, there is an exposure of about fifteen feet in thickness of the Devonian beds. The lower part of the bluff is composed of soft, well-laminated, fine-grained shale, dark gray in color, alternating with white or red layers, and consisting of a fine, more or less sandy silt, with an abundance of little flakes of mica. This locality was discovered in 1870 by my assistants, Messrs. T. B. Comstock, Herbert Smith, and Phineas Staunton, who collected from the variegated shales a pretty little *Discina*, with which are associated two species of *Lingula*.

The only other fossils yet found in the shales consist of obscure, flattened casts, probably of some marine plant, together with a number of minute, discoid bodies, sometimes arranged in little chains, but of which I can make nothing.

Above the shales, just described, is a heavy bed of a not well laminated clay-rock, white, mottled with red, in which I have found nothing except some very obscure fucoid-like markings. All these beds have a very slight inclination to the south-eastward. Going northward, the bluffs gradually increase in elevation, but are probably nowhere more than fifty feet in height. The inclination of the beds of the Ereré plain is quite variable, and, over large areas on both sides of the igarapé, they are almost perfectly horizontal, often forming open campos of large extent, which are sometimes so exceedingly stony as to appear as if macadamized, the soil not being sufficient to support even a growth of grass.

The lowest beds of the series, that I have examined, are exposed in the north-western part of the campo at the cachoeirinhas of Paricá* and Cumamirí† situated on branches of the igarapé de Ereré. At the former locality the rock varies from a very hard, dark-colored, silicious shale, to a well bedded, dark gray, compact, cherty rock, breaking with a conchoidal fracture. The strike of these beds, taken along a water-line, is N. 10–15° W., the dip being westward and exceedingly slight. Leaving this locality and going eastward, the surface of the plain rises noticeably for about a mile, the dip being towards the west, continuing with but few elevations to the cachoeirinha do Igarapé do Cumamirí, where similar cherty rocks, with the same very slight westward dip, are seen in the bed of the stream, forming, during the dry season, a little cascade, which at the time of my visit was not more than two feet in height. The cherty beds have afforded no fossils, except a few fragments found in the more shaly portions.

Between the cachoeirinhas, above named, the beds are traversed by two dykes, which crop out, much decomposed on the surface; one forming a low ridge running nearly north–south, while the direction of the other is nearly east–west. On the right bank of the igarapé de Ereré, and some distance above the trail to Monte-

* A tree, furnishing a seed out of which the Indians make snuff.

† This appears to mean Little Milk.

Alegre, a sulphur-spring bubbles up through the Devonian shales. The water is limpid, of a greenish tinge, and with a strong sulphureous odor and taste; notwithstanding which, the basin in which the water collects is inhabited by little fishes and a species of *Ampullaria*. I regret that I failed in an attempt to bring away some of the water for analysis, especially since at Monte-Alegre it has considerable repute for its medicinal qualities.

Going eastward from the igarapé along the Monte-Alegre trail, one rises by an ascent of a few feet from the alluvial flat to the Devonian plain, that, almost as level as a floor, stretches to the foot of the Monte-Alegre highlands, beneath which the Palaeozoic beds disappear. The surface is quite destitute of soil and is strewn with little nodules of iron-stone, so that large areas are quite barren both of wood and herbage.

Just before reaching the Monte-Alegre highlands, several slight elevations, only a few feet high, are met with, that show, in place, light-colored shales, with thin bands of a reddish sandstone, some of which are full of fossils, *Streptorhynchus Agassizii, nob.*, being especially abundant. At this locality I obtained a single glabella of what appears to be a new species of *Homalonotus*.

If we now retrace our steps to the igarapé, and follow the path to the village of Ereré, we shall find the Devonian beds forming a flat or rolling, open campo, with long, gentle ascents and descents, in the rain-courses of which are indifferent exposures of whitish shales, apparently nonfossiliferous. On this campos-land there is very little soil, what there is being baked hard and strewn with small, angular fragments of red sandstone, that occasionally furnish fossils. The surface is often covered with little, rounded iron-stone nodules, scarcely larger than beans, sometimes forming a continuous layer. The campo is sparingly clothed with coarse grass, trees being few, scattered, stunted and disfigured by campos fires. Occasional large, arborescent cactuses heighten the dry, barren appearance of the landscape. The low places are covered with woods densely filled in, on the drier grounds, with *Curuá* palms.

Between the igarapé and the village of Ereré are several large dykes that project above the surface like ruined walls, but the vein-rock is always badly decomposed, so that it is difficult to say what it originally was. Similar dykes occur in all parts of the plain.

The strata, for a few feet on each side of a dyke, are usually considerably altered, being hard and flinty, while at the same time they are tilted upward at a more or less strong angle, as if the rent had been widened, not by a horizontal movement of the beds, but by the bending upwards of the strata on both sides of the fissure, through the force of the extruding matter. Sometimes in the denudation of the surface, these dykes, as just remarked, project like ruined walls, while at others, with the hardened strata on each side, they form low ridges, that run, sometimes for long distances, on the surface of the campo.

In the village and immediate vicinity, there are no good rock exposures. The most interesting locality, and by far the best collecting ground for fossils, lies at a distance of about two miles to the northward, in a large, open, treeless, grassy campo. The surface here is quite undulating, and strewn with angular fragments of a red or whitish sandstone, rarely ever seen in place. In the rain-courses the rock exposed is usually a fine, soft, well laminated, whitish or yellowish shale, usually quite unproductive in fossils. From the yellow shale I have obtained only a large *Lingula*, fragments of *Vitulina pustulosa Hall, nob.*, showing the imprints of the little spines and a single ventral valve of a *Spirifer*. This shale, which I know only in a somewhat decomposed state, is largely made up of minute silicious particles and little mica flakes. It takes excellent casts of fossils, and would probably repay more careful examination, but I was unsuccessful in my search for a good exposure.

The great repository of fossils is the sandstone, which, as on the eastern side of the igarapé de Ereré, appears to form bands, a few inches in thickness, interstratified with the shales in their upper part. On the washing out of the shales by water the sandstone has cracked up and been left lying in fragments on the surface. Fossils were collected from the loose fragments, but, on the summit of a low ridge, to the north of a deserted house, I discovered on my last visit a layer of the sandstone, which, with great labor, Mr. Derby and I succeeded in uncovering; and this yielded us a magnificent lot of fossils. The layer is only about four inches in thickness, but it is completely filled with fossils which are usually in the shape of moulds, the organic matter having been entirely removed. The rock is com-

posed of fine, sharp, quartz-sand, with a slight admixture of clay, and occasionally a tiny, silvery flake of mica. The fragments of sandstone lying on the surface are usually more or less decomposed, and are apt to be stained with iron oxide, which makes them very hard on the outside, while sometimes the surface is covered with a thin layer of the same material. When unaltered the rock appears to be white, or slightly reddish in color.

The fossils most abundant in the sandstone are the Brachiopoda, which are represented by twenty species belonging to the following genera: *Terebratula, Vitulina, Tropidoleptus, Spirifera, Crytina* (?) *Retzia, Streptorhynchus, Chonetes, Orthis, Rhynchonella,* and *Lingula,* all of which are described in the paper of Mr. Rathbun, annexed. The only other Articulates are the trilobites which are represented by a beautiful *Dalmania* that occurs in abundance, and a species of *Homalonotus,* of which last only a fragment is known.

Several species of Lamellibranchs occur in the sandstone, belonging to *Nuculites, Palaeoneilo, Grammysia* (?), *Edmondia,* and one or two other genera. The Gasteropods number about eight species, representing the genera *Bellerophon, Platyceras, Holopea, Pleurotomaria* and *Tentaculites.* A few fragments of crinoid stems have been found, together with a number of obscure markings which may be of plants.

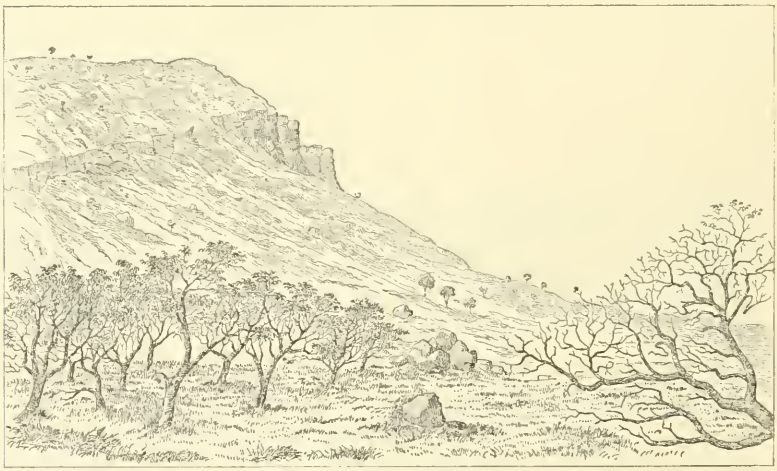
Serra of Ereré from the North.

This fauna has an unmistakable Devonian facies, but it is difficult to determine its exact equivalency. In some features, as for instance in *Spirifer Pedroana,* which closely resembles *S. varicosa,* the fauna recalls that of the Corniferous, while in the occurrence of *Tropidoleptus* and *Vitulina* it approaches the Hamilton.*

* See concluding remarks to Mr. Rathbun's paper.

The serra of Ereré is a high, narrow, rugged, irregular ridge, four or five miles long, trending about east-north-east and west-south-west, and with abrupt and often precipitous sides. The upper part of the serra is formed of very heavy beds of sandstone, that dip to the south-south-east at an angle varying from 5°–20°. The top of the ridge is very irregular, ragged and picturesque, the sandstone being often exposed, in situ, in bare ledges or ridges, or lying strewn about in enormous blocks over the surface, which is so rough that it is no easy task to traverse the mountain from one end to the other. Along the northern side of the serra the sandstone forms a broken line of bluffs, varying in height from a few feet to several hundred; and just opposite the little village, and shown in the cut, there is a splendid precipice, remarkable for being rent by fissures from top to bottom. Below these bluffs the side of the serra slopes very steeply, presenting the appearance of a talus, the surface being covered with loose fragments of sandstone.

At both ends the serra is cut squarely off, but on the east the sandstone extends downwards, with a strong dip, disappearing under the more modern clays and sands of a swelling ridge like that of Monte-Alegre, that stretches eastward to the igarapé, covered with the characteristic vegetation of the high, sandy campos.

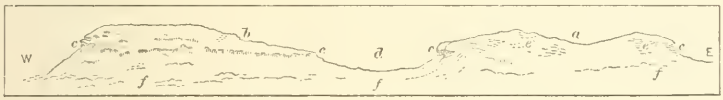


Serra of Ereré from the East.

On the southern side of the serra, and near the eastern end, these sandy campos rise by a gentle incline nearly to the summit, so that

one may ascend the serra on horseback. To the westward of this incline, the sides of the serra are exceedingly rough and picturesque. On this side there is hollowed out of the sandstone a large and curious grotto, called Itá-tupá-óka.* This is situated at some little height above the base of the mountain, and is reached by a steep ascent, encumbered by blocks of sandstone, and overgrown with cacti and stiff bushes. The cavern forms a large, irregular, bat-inhabited chamber 50–60 feet long, and with a sandy floor. Wallace had already described the entrance, which is 10–15 feet high, and divided into two parts by a layer of sandstone that runs horizontally across the opening about five feet from the floor. This layer is harder than the rock above or below, much of which is very friable.

Immediately west of the serra of Ereré, and separated from it by a deep notch, is a short, angular ridge, with the same trend and geological structure, called Aroxí. In this mountain, which is a little lower than Ereré, the inclination of the sandstone is very marked. On the southern side a broad belt of large cactuses extends from top to bottom.



Serras of Ereré and Aroxí from the South-west.

To the westward of Aroxí, at a little distance, is another short, high, conical ridge, called Aracurí, while beyond appear to be several other hills, in a line with those just enumerated, and apparently part of the same outcrop.

The sandy campos decline towards the southward from the serra for several miles, when they rise gradually to the rocky plateau of the serra of Paitúna. This serra I did not visit, but in 1870, Mr. Phineas Staunton examined it for me, reporting it to be composed of horizontal beds of the same kind of sandstone as that of the serra of Ereré, so that the two serras probably form part of a synclinal fold. Paitúna is flattened on top, and very broken and precipitous on all sides. Wallace, who visited it, says that the curious, mushroom-like pillar on the southern end is composed "of friable

* Literally, God's stone house. *Itá*, stone: Tupá, or Tupána, God: and óka, house.

stone in horizontal layers and is constantly decaying away by the action of the weather. The top is formed by a stratum of hard, crystalline rock, which resists the rain and sun," etc. This upper crystalline rock is probably like the excessively hard sand-stone of the serra of Ereré. The pillar bears the name *Induá ména** in Lingoa Geral, or *Mão de pilão* in Portuguese, and, together with another similar column in the vicinity, figures in the legend of the Paitúna, a mythological personage from whom the Indians say that the serra has derived its name.

The sandstone of Ereré is, for the most part, composed of fine, rounded grains of clear quartz, with a silicious cement, the rock being so excessively hard that a fracture passes directly through the sand grains. The rock has a slight brownish tint, and a saccharine look, sometimes being almost translucent in thin flakes. On the surface the cement decomposes, becoming milk white, and the hard beds scale away in concentric coats, giving rise to rounded surfaces. This is the general character of the Ereré sandstone, but there are some very fine-grained layers like quartzite, while others are soft and friable. The rock is never very coarse, and pebbles are rare. The bedding is massive, and oblique lamination is everywhere observable.

Underneath the sandstone at the notch of Aroxí there is a thick band of hardened, variegated clay. Being well jointed and of unequal hardness, the Ereré sandstones, have, under denudation, given rise to a multitude of curious pillars and imitative forms. To the latter class belongs a large rock on the east extremity of the serra, called *Pirayauára*† or porpoise, because of its resemblance to that animal, while near by, on the brink of a precipice, is a projecting, bird-like rock, called *yurutauí*. On the summit of the mountain, and overlooking the lofty precipice facing the village, is an immense, isolated rock, about fifty feet high, which, from afar, looks like a huge boulder perched upon the top of the serra. This mass, which is represented in the cut on page 213, is composed of a very hard, white sandstone, obliquely laminated and rounded by decomposition. Its western side is covered with rude Indian drawings in red paint.

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* Pestle. Sometimes it is called *Induá*, the mortar. *Ména* means husband. By some the pillar is called *yapóna*, the oven.

† *Pirá*, fish, and *yauára*, dog.

Standing just in front of the cliff at the upper part of the serra, on the northern side near the Aroxí notch, is a large, high pillar, covered with similar rude paintings, and apparently at one time an object of superstitious regard. Similar figures are drawn on the cliffs near by and in the notch. These so-called hieroglyphics of Ereré were examined and copied by Wallace, but the sketches were unfortunately lost. I have reproduced some of the more important forms in the *American Naturalist*.* Mr. J. B. Steere, on a visit with me to the mountain, had the good fortune to find a large fragment of silicified wood, imbedded in the sandstone, near the great painted rock on top of the serra. This is clearly coniferous in structure, but Dr. Dawson, to whom it has been referred, has not been able to determine it. Mr. Steere also found what appears to be the impression of the trunk of a large tree on the surface of a bed of sandstone, on a ridge about a quarter of a mile to the southwestward of the painted rock.

One point in the geology of the Ereré District is settled upon the best of palaeontological evidence, and that is, the age of the beds forming the great plain to the north of the serra. These are certainly Devonian. But what is the age of the rocks forming the serra itself? I have already expressed the opinion that the strata of the serra were disturbed before the beds forming the plains were laid down, since these strata are highly inclined, while the Devonian rocks bordering the base are quite horizontal, presenting nowhere more than an exceedingly slight inclination. There is no reason why coniferous wood should not occur in strata of Devonian, or even Upper Silurian age under the Equator; but I must freely confess, that, after carefully considering the whole subject, it seems to me quite probable that the Ereré sandstones are really newer than the fossiliferous beds of the plains, and that these last may dip under the serra; but, if this is the case, it is extraordinary that the sandstones, if once continuous over the plains, should have been so completely worn away and that the plains should have been so very evenly denuded. It is also somewhat strange that the structure of the serra of Tajurí should differ so markedly from that of Ereré. I have made a long and careful search for exposures along the base

* Brazilian Rock Inscriptions, Amer. Nat., May, 1871.

of the serra of Ereré, but I have been unable to determine from stratigraphical evidence the relative age of the beds of the mountains and plains. There can be no doubt that the serra of Ereré is older than the true table-topped hills, and the question of its glacial origin needs no further discussion.

In the sandstone of the serra are occasional veins, partly composed of iron oxide. The original vein-rock appears to have been traversed by a perfect network of delicate veinlets of hematite, forming interlacing laminae often not more than one or two millimetres in thickness, which, on the decomposition and removal of the vein-rock, form masses presenting the appearance of honeycombed wood. In 1870, I made barometrical measurements on the summit of Ereré, which gave me the height as 970 feet. Since the observations were taken, I have noticed that a point to the westward of those I had chosen appears considerably higher, so that the serra is not far from 1,000 feet in height.

The vegetation of the serra resembles that of the high, sandy campos of the vicinity, and is very scanty. The sandy tracts are sparsely sown with tufts of long, coarse grass. Trees are as usual very small, rough-barked, gnarly-branched, stunted and scorched by campos fires. Cajú trees grow all over the serra, and the visitor will always gratefully remember their thirst-assuaging, acid fruit. The cajueiros of the serra are all very small, and the fruit is dwarfed and rather sour. On the sandy campos the tree is everywhere met with, and the fruit is sometimes very large and delicious. I have never seen a cajú tree on the Devonian plain. It is a true campos species, and, as elsewhere in Brazil, it appears to be confined to dry, sandy soils. It flourishes also on the campos in the vicinity of Santarem, where, as well as at Monte-Alegre, a very delicious wine is made from its juice, some of the brands being not inferior to good grape wine. The manufacture of this beverage was known to the old Tupís, who called the liquor *akayú kauím*. The fruit has an extended reputation in Brazil for its anti-syphilitic properties, and it is supposed that the wine also possesses medicinal virtues. Two palms are common on the serra, the *Sacurí* and *Jatá*. The former appears to be allied to the Curuá, but the leaves are much more stiff and erect. It is rarely seen elsewhere in the vicinity. The Jatá grows to a height of about fifteen feet, and is a very con-

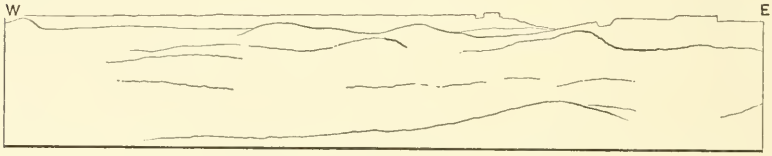
spicuous element in the vegetation of the serra. It also occurs on the campos. Armadillos and jabutí-tortoises abound in the serra, and a pretty little species of deer occurs, but I could never succeed in getting a shot at one.

Before we leave the serra let us take a survey of the landscape. The eye follows the sandy campo, with its scattered trees and patches of bare sand, southward to the flat, insignificant-looking, rocky serra of Paitúna, which, tied by the high campos to the serra of Ereré, forms a point projecting southward into the alluvial bottom of the Amazonas. On the right, or west of Paitúna, the alluvial lands form a sort of bay, bordered by sandy campos-land. Into this region I made an excursion in 1870. From the Aroxí notch the sandy and sparsely-wooded plain slopes gradually from the mountains to the southward, for a few miles, to a little igarapé, called, I believe, Maxirá; but this name I have also heard applied to the serra of Aroxí. Crossing the stream, one finds on the opposite side a line of terraces rising about 10–15 feet, if I rightly remember, above the general level, but considerably more above the Amazonas. These terraces are composed of beds of variegated sands and clays, in which I made an unsuccessful search for fossils. This formation appears to occupy a large area to the westward, and the terraces mark an old shore-line when the land stood at a somewhat lower level than at present, and the Amazonas, still a broad arm of the sea, had not yet passed into the riverine condition. Between the terraces and Paitúna is the alluvial bay just alluded to, in which is a small lake and a magnificent grove of miritís. The lake, I suspect, disappears during the dry months, as I do not find it represented on one of my sketches.

Eastward of the serra of Ereré, a high, rounded, sandy plateau stretches off to the igarapé, on the opposite side of which the Monte-Alegre highlands run off obliquely to the villa, in a line of steep slopes. Between these highlands and Paitúna is the alluvial bay traversed by the igarapé of Ereré. Across its mouth stretches the Curupatúba, and southward lie the beautiful, smiling plains, beyond which is the Amazonas, with the long, level line of smoke of a descending steamer. We trace to the northward the ridge of Monte-Alegre, at first level-topped, then more and more irregular, to the splendid, blue, mountain mass of Tauajurí, which, with pre-

cipitous front, heaves its back against the horizon, like a giant wave ready to break upon the level plains of Ereré, that lie spread out before us, flecked with open, bright, grassy campos, dark woodland, and coursing cloud-shadows from the glorious sky above. Below us, and beyond a little strip of woodland, is the little village of Ereré, with its white church and scattered, thatched houses.

In the west are the tops of Aroxí and Aracurí, with low lands beyond on the horizon, while, northward from the hills, stretches a belt of low, wooded ridges, skirting the campos on the west and north, and bending round to close the circuit with Tauajurí. And away beyond them, on the far-off northern horizon, are table-topped hills, evidently of the same formation as the serras of Parú. To give a clearer idea of the topographical features of the highlands west of the campos and of the distant table-topped hills, I have introduced the following little outline sketch taken without alteration from my note-book.



Sketch looking Northward from Serra of Ereré.

A mile or more west of the village, a very narrow, angular ridge extends northward from the northern side of the serra of Ereré, in a straight line for perhaps a mile, presenting a very even height of about 200 feet, as nearly as I could judge. On the eastern side this ridge is very steep, and near the top there is a line of exposures of a rather compact, not well laminated clay-rock, mottled red and white, and apparently without fossils. This has a decided dip to the westward, and the western slope of the ridge is consequently less steep than the eastern. The ridge is unfortunately covered with small trees, abominable "Devil's fish-hooks" and cactuses, so that it is very difficult to study it. After running along for a considerable distance, it breaks down abruptly, or perhaps more properly speaking, it is cut through by a broad gap, through which runs the road to Maecurú.

In the gap, the lower part of the ridge to a considerable height, is seen to be composed of a heavy mass of diorite; but whether this

rock forms a dyke, or a bed interstratified with the clay-rock, I could not determine. In the rain-courses of the Maecurú road the diorite has given rise to a great number of well-rounded boulders of decomposition, imbedded in a dark soil of decomposed trap; and, at a hasty glance, they might be taken for erratics. On the northern side of the gap the ridge appears to be continued for some distance. Looking from the top of Ereré there appears to be a ridge running northward from the Serra de Aroxí like that just described. I made an attempt to reach it, but lost myself in the thick woods. An attempt to explore the zone of highlands to the west of the campos proved very unsatisfactory. I made a very long excursion among these hills, but I cannot give an intelligible account of their structure, because of the want of exposures and the difficulty of making and recording observations in the dense undergrowth, and in the beds of the exceedingly tortuous igarapés. The prevailing rock appears to be similar to that exposed in the ridge extending northward from Ereré, but I found also a few wretched exposures of a firmly laminated, dead-black shale without fossils. I know nothing of the relation borne by these beds to the undoubted Devonian beds of the plains. Trap dykes are very numerous, and some are very heavy. The whole region seems to have been much disturbed. At Matarupí and elsewhere in the vicinity there are superficial deposits of impure haematitic iron ore. Campos, apparently composed of Devonian rock, extend from the ridge running north from the serra of Ereré to the serra of Aroxí.

Almost directly north of Monte-Alegre is an isolated, precipitous hill several hundred feet in height, which, in company with Messrs. Smith and Staunton and my guide Sr. Liberato, I tried to reach from the campo on the southern side. All I was able to do was to climb a sort of high platform, in front of the hill, which was so covered with spiny plants, *yurupari pindá* and underbrush, that I was obliged to turn back. I should have persisted, but that I had several hours' march before me over the stony plain to Ereré that evening. I could only determine that the platform above spoken of was composed of diorite like that of the ridge just west of Ereré.

The little hamlet of Ereré is situated on the Devonian plain, a little more than a mile to the north of the eastern extremity of the

serra of Ereré, and consists of some twenty to thirty miserable thatched houses and a neat little chapel. The inhabitants are civilized Indians, of more or less mixed blood, but it is not known from what tribe or tribes they are descended. The old people still speak the Tupí language, but it is becoming so rapidly superseded by the Portuguese that it is only rarely used for conversational purposes. The people are quiet, orderly, and clean, and I came to have a real respect for them. Sr. Liberato, my host, is a fine, intelligent, trustworthy fellow, to whom I am under deep obligations for the faithful way in which he served me on both visits to Ereré, and I take pleasure in recommending him as a guide to future visitors. The men of Ereré are fishers, hunters, vaqueiros, and, like other Indians, work well when they must. Of the industry of the women I cannot speak in too high praise. On them falls all the labor of the field and household; from morning to night they are steadily at work, and I never think of Ereré without fancying that I still hear the measured rhythmic beat of the caraná wand, in beating cotton for spinning.

The sandy ridge or plateau east of Ereré shows but few superficial, and not very interesting exposures. Like the Monte-Alegre highlands, it appears to consist of soft Tertiary beds, horizontally stratified, which have been much denuded down and superficially worked over, the clayey particles having been washed out, leaving the sand lying loose on the surface. On the northern side of the ridge, at some distance east of the serra, is a small, isolated hill composed of fine clayey sands, white, variegated with purple, together with white sands, sufficiently compacted to form a low bluff, that runs round the eastern side of the hill. The ridge behind is composed of the same materials, as is seen in several deep rain-courses. On the hill just described, and in its immediate vicinity, I picked up several loose fragments of a very curious rock which I was unable to find in place. It consists of iron-oxide and is filled with little, empty cell-like cavities separated by very thin walls, and consequently spongy and very light. Each cavity corresponds to a sand-grain which has been dissolved out, leaving only the iron oxide that cemented the whole together. The grains were probably calcareous, but I have no clue to the origin of these very interesting fragments.

The serra of Tauajurí,* though in plain sight from Ereré and from the vicinity of Monte-Alegre, is quite unknown to the white inhabitants of these places, and I found none except Indians who had visited it. Failing to reach the mountain in 1870, I made an excursion thither the following year, in company with Messrs. Derby and J. B. Steere. We left Monte-Alegre on foot at day-break, accompanied by four Indians, striking off northward over the highlands, following the road to Saudoso, a little agricultural settlement, situated on the low grounds east of the ridge.

The Monte-Alegre plateau is noted for its flat, rounded outlines, its long, gentle slopes, rarely gullied by rains, its superficial coating of coarse sand, and its peculiar campos vegetation, in all which features it agrees with the similar elevated, sandy campos of the vicinity of Ereré and Paitúna, and also with those of Santarem, which last I shall not attempt to describe here. The covering of loose, coarse sand completely masks the geological structure of the plateau, except along its southern border and in a few localities where the underlying beds come to the surface in knolls. Here and there on the road, across the plateau, from Ereré to Monte-Alegre, one meets with slight knolls composed of small, ferruginous concretions, cemented together and resembling a conglomerate. The surface sands are so coarse and loose that it is very fatiguing to walk over them. The vegetation they support to-day is that of the high, sandy campos districts everywhere in northern Brazil, modified by campos fires. The sandy campos of the Ereré–Monte-Alegre district closely resemble those of Piauhy, Pernambuco and Bahia. Trees are sparsely sown, and, having been singed by fire, are small, rough-barked, stout and gnarly-branched, and thick-leaved. A large proportion of the trees are cajús, with whose grateful acid fruit the traveler may refresh himself. Grass grows only in widely separated tufts, and the surface is yearly burned over. The effect of these campos fires is most disastrous, and if kept up they must inevitably convert the ridge into a desert.

*I am not sure that this is the correct form of the name of the serra. The pronunciation varies from *Tajurí* to *Tayurí*, *Tauayurí*, *Tauajurí*, and I have even heard *Tauacurí*. Penna uses *Tauajury*, and this appears more nearly right, but it would still be a Portuguese form. In all this uncertainty it seems scarcely worth while to inquire into the origin of the name. The first point to be settled is, whether the first part of the word, in lingoa geral, is *itá*, stone, or *tauá*, a kind of clay.

The Monte-Alegre campos are quite unfit for agricultural purposes, but according to Sr. Valente, who accompanied us for a part of the way to Tauajurí, beans and even corn may be grown during the wet months; but mandioca cannot be raised on these lands, because it requires at least six months to mature, and, during the rains, the roots are apt to be washed out of the soil. The climate of the Ereré–Monte-Alegre district, during the dry season, is very pleasant. Day after day, and week after week passes without a storm. The days are hot, the thermometer in the shade ranging about 90° in the middle of the day; but the air is so dry and there is so constantly a stiff sea breeze blowing, that the temperature in-doors is very agreeable. On the plains, I have found the heat oppressive while in exercise, though much more endurable than in the interior of New York in the summer months; but the moment one stands still, even on the open plains, he is apt to be chilled by the breeze. The nights are very cool, and one is obliged to sleep wrapped in a blanket and with closed doors. Late in the dry season and in the rainy months, the mosquitoes are a veritable plague. Of the wet season on the Amazonas I can say nothing from my own personal acquaintance.

As the plateau approaches Tauajurí it becomes more broken, and better wooded, but it soon gives way to hills, probably of a different geological structure. The lowlands east of the ridge are well wooded, but, except in marshy places, the forest is not luxuriant, and the same seems to be the case with the higher plains of the vicinity.

We reached Jacaré at the foot of the serra at 3 o'clock P. M., having rested for dinner at Saudoso for perhaps a couple of hours, so that the distance from Monte-Alegre to the base of the mountain must be about 18 miles. At Jacaré we found a ruined house, and as we had outwalked our guides and were obliged to wait until late in the afternoon for them to come up, we here spent the night, as well as the carapanás and the white ants, that swarmed from the rotten timbers of the house, would permit.

On the banks of a little, clear-water igarapé that runs through the forest, bordered by beautiful palms, we found sandstones, and I discovered a bed of dark-bluish limestone, that looked as though it ought to contain fossils, but afforded us nothing recognizable. Its strike was N. S., and the dip 30° to the eastward.

Early the next morning we climbed the serra by a very rough, steep ascent through the woods over loose rocks, and worked our way with much difficulty nearly to the western end of the mountain. The serra is a sharp-crested monoclinal ridge, trending approximately E. S. E., W. N. W., and much longer than Ereré. The southern side is exceedingly steep, almost precipitous, and wooded nearly to the top, along which runs a line of low bluffs. The northern side slopes off at an angle of 10°–15° in a series of beautiful campos interspersed here and there with trees. This side of the serra is scored deeply with deep parallel gorges that extend in many cases up to and through the crest of the serra, which consequently presents a notched appearance when seen from the south.

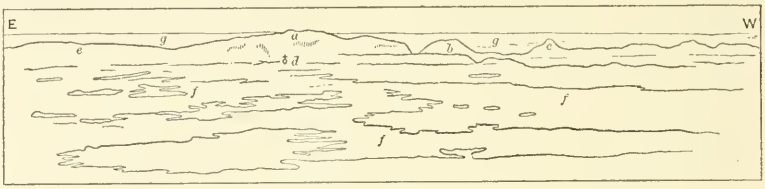
The uppermost stratum observed near the crest of the serra was a light bluish, nearly white, tough, not well laminated clay-rock, with a large percentage of very fine sand in its composition. Beneath this are beds of fine, clayey sandstone, white, mottled with purplish, and with fucoid (?) casts, alternating with which beds are shaley bands and layers of sandstone, the whole not well exposed. Then follow about 4 inches of red shaley iron-stone, overlying a bed of rather coarse sandstone about 10–15 feet in thickness, which forms a bluff running along the upper part of the southern side of the serra, while underneath are light purplish brown, fine-grained sandstones poorly exposed. The dip of the Tauajurí beds in the serra is about 10°–15° towards the N. N. E. or N. E.

I found the elevation of the serra at its highest point to be 850 feet above the level of the sea.* Tauajurí appears to differ entirely from Ereré in its geological structure. It is, indeed, true that I examined only the upper beds of the series, but if the Ereré sandstone were represented lower down, it is hardly possible that it should not have shown itself in bluffs on the mountain side.†

* I made but a single observation, and as the mountain looks much higher than Ereré, I suspect that the observation may be unreliable.

† Tuajurí is resorted to by the Indians of Monte-Alegre for the purpose of gathering the bark of the cumaté or cumati tree (*Apocynea vel Asclepidea follicularis? v. Mart.* Glossarios, p. 393, sub voce *cumatí*), the sap extracted from which is used to varnish the drinking gourds, for the manufacture of which Monte-Alegre has been so long famed. The name of the tree appears to be derived from *kamŷ'g*, milk, sap, and *eté*, true. *Cumaté* probably more nearly preserves the original form than *cumatí*, but I suspect it is still a corrupt form. The sap is obtained from the bark, I believe, by pounding and squeezing. The cuias are prepared as follows: The

From the summit there is a magnificent view over an immense area of country, the whole Monte-Alegre–Ereré highlands and the great Devonian plain being distinctly seen. I have reproduced from my note-book a little sketch of the Ereré hills taken from the top of Tauajurí, because it shows a line of hills extending westward beyond Aracurí, apparently forming parts of the same outcrop.



The Devonian plain and serras of Ereré from the Serra of Tauajurí.

To the northward of the zone of highlands bordering the Ereré plain on the north and west, the country is low, somewhat irregular, though with but few hills, and uniformly covered with forest. Along the horizon, on the north-west, high, table-topped hills stretch along for many miles like a cordilheira. To the east of Tauajurí the country is low, but still considerably higher than the Amazonian bottom. Just east of the Monte-Alegre highlands these higher grounds do not come down to the river, but their margin, once an old shore-line, describes a strong curve forming a sort of bay which has been silted up and converted into alluvial grassy campos, while, skirting the old shore, is a long, narrow, crescent-shaped lake, once a side-channel of the river. This alluvial bay and lake put one in mind of the campos and paraná-meríns of Taperinha, of which I hope to speak in another paper.

From what I have seen of the Amazonian valley in the province of Pará, I am of the opinion that the greater part of the country

gourd, or fruit of the *Crescentia Cuyeté* (kniá-eté=*cuia par excellence*) is cut in two and the inside pulp removed. When the rind is dry it is carefully scraped, both inside and out, and polished with the sandpaper-like leaves of the caimbé tree (*Curatella*). A little charcoal of the wood of the páo de Boia or Mututi is then scraped into the cuia, and, having been mixed with a few drops of the cumaté, is rubbed over the surface of the vessel. Over this the cumaté is applied three or more times, and on being allowed to dry, forms a sort of purplish varnish. The cuias are then inverted over sand on which stale urine has been sprinkled, but some persons fill them with the urine and allow them to stand. The cumaté varnish, probably affected by ammonia fumes, soon turns jet black and forms a hard, brilliant, durable lacquer, not affected by hot water or rum. The cuias of Monte-Alegre are often painted in color, with very tasty and often elaborate designs, by the Indian women.

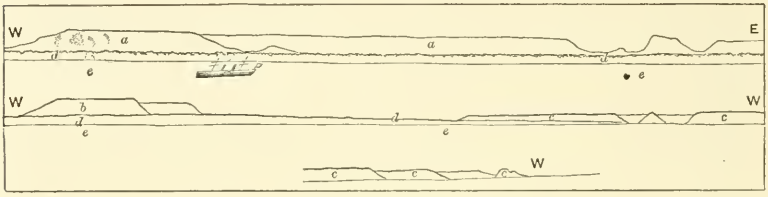
is covered with forest, and that open campos are the exception. These last are confined either to the very low lands inundated during the wet season, but left dry several months in the year without rain, or to the high, level, never inundated sandy grounds and the hard-baked, clayey or stony plains of Ereré. The alluvial, bottom of the Amazonas in the vicinity of Monte-Alegre and elsewhere, is, over very large areas, destitute of trees. My friend Dr. Woiekof, the Russian savant, is of the opinion that the treelessness of prairies is often due to the rank growth of grasses. I am inclined to think that this is in great part the cause of the want of trees on the Amazonas river-bottom; but there is still another reason, and that is the dryness of the climate, and the baking of the alluvial clayey soil in the dry months. The forest gains a foothold only on the borders of the streams and in wet places, where it holds its own by its proximity to the water.

The only really tropically luxuriant, true jungle is found on perennially wet grounds. This is always full of palms, *Phœnacospermums*, *Heliconias*, *Arums*, large-leaved plants, and is tangled with vines and creepers. The vegetation of the higher and drier grounds is not very luxuriant, especially if the land be stony, sandy, or clayey. Such is the character of the forests of the higher lands everywhere in the vicinity of Monte-Alegre and Ereré. The trees are, for the most part small, and the undergrowth is largely composed of *curuá* palms.

Even where the land is high, if the soil is only damp and rich, the forests may be exceedingly luxuriant and composed of trees of giant size, as for instance on the black lands on the top of the bluffs near Santarem, and on the high lands of the Tapajos, Tocantins and Xingú.

The generally received opinion that the whole valley of the Amazonas is covered with one dense, rank, steaming forest, impenetrable and indomitable by man, is as erroneous as the school geography stories of enormous snakes and wild beasts, which last, somehow or other, were always hibernating when I was in the country. The forests of the Monte-Alegre–Ereré district and of Santarem as well, are far from luxuriant, bespeaking, during the dry season, a very dry climate and a fault of moisture.

The table-topped hills of the Amazonas, so frequently described by travelers consist of several isolated mountains or plateaus of circumdenudation composed of horizontal strata, which lie on the northern side of the river between Prainha and Almeirim, and known collectively as the serras of Parú. They are characterized by their broad level tops and their very abrupt, sometimes precipitous sides. The western-most of these serras is that of Paraná-quará, eastward of which is that of Velha Pobre, while still farther east are the serras of Almeirim. The general appearance of these mountains is represented in the accompanying sketch made from the river.



Every traveler has felt it his duty to describe the table-topped hills, and they have been represented, over and over again, by fancy sketches that look no more like the serras of Parú* than they do like any other flat-topped hills, but, strange to say, until 1871, no explorer except v. Martius has ever visited them. He landed at Almeirim on his journey down the Amazonas and climbed the serra in the immediate vicinity, which he estimated as scarcely 800 feet in height. He, however says very little concerning its geological structure, but his account of his visit is so important that I give a part of it below.†

*I cannot refrain from protesting against the admirably drawn but abominably inaccurate sketches that illustrate the magnificent volumes of Marcoy. The sketches of Santarem and Pará might just as well have been labeled Pernambuco and Bahia. As for the portraits that adorn the volume they are, so far as I can judge, as inaccurate as they well can be.

†"Der Berg von *Almeirim* liegt etwa eine Stunde nördlich vom Ufer des Stroms entfernt, und sein Gipfel mag kaum acht hundert Fuss über diesen erhöht seyn. Wir hatten bald einen dichten nicht hohen Wald durchschnitten, und tratten nun in eine lichte Grasflur heraus, welche in ihrer Physiognomie die grösste Achnlichkeit mit den campos agrestes von Piauhy darstellte. Grosse, grau-grüne, haarige Grasbürchel, mit mancherlei blüthenreichen Kräutern wechselnd, stehen ziemlich weit aus aufgelösten braunen Sandeisenstein. In den Niederungen der Flur sind hier Brüche von geringer Ausdehnung, ebenfalls mit Gras bedeckt, dort inselartige gruppen von Gebüsche und eine eigenthümliche Palme (Lyagous cocoides, Mart. Palm, t. 89–90). * * * * Der Berg selbst, welcher diese anmuthige Landschaft schliesst, indem er parallel mit dem Strome von O. nach W. läuft, ist an seinem untern Abhange mit gleicher wiesen vegeta-

In 1870 my time was so completely exhausted at Ereré, that I was obliged to return home without visiting the table-topped hills, and one great object of my journey to the Amazonas in 1871, was the examination of one of the true table-topped hills. I selected Parauáquára, not only because it appeared to be the highest of these mountains, but also because, being precipitous, it would be the more likely to afford good sections.

I left Praïnha very early on the morning of the 14th of November, in a montaria, and dropped down with the current nearly to the mouth of the Rio Yauarí* (Javarí). During the night and to 7½ o'clock the terral blew gently down stream, and it was deliciously cool; after that time the wind gradually lulled, the sea breeze beginning to blow at about 9½ o'clock. This continues to blow all day regularly during the dry season.

The Yauarí has a sort of miniature delta. Just before entering the Amazonas the river bends eastward, separated from the river by a grass-covered strip of alluvium, across which two channels are cut. It was low tide when we arrived at the mouth of the river, and we were obliged to wait for sometime before we could enter. The Yauarí resembles the igarapé de Ereré in having a very deep, narrow channel, about 200 feet wide, with steep banks lined with trees which are, however, larger than those of Ereré, while the banks are cleaner. The vegetation is largely made up of the following trees: *Mututí*, *Acapú-rána* † (*Wullschlägelia?*), *Araparí*, ‡ *Caxingúba* § (*Pharmacosycea?*), *Piranhaúba*, ‖ *Taixí* ¶ *and Uapuí*.[1]

During the dry season the water of the river and its branches is quite stagnant, excessively dirty, warm and fever breeding, its

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tion, oben aber mit einem lichten Walde grosser Bäume, besonders vieler castanheiros, bewachsen, auf dem steilen Wege findet man nirgends ein anderes als das angegebene sandeisensteingebilde. Kleine Quellen kommen aus den Flanken des Berges auf die Wiesen herab, und die Waldung der Höhe hegt behagliche kühle."—*Spies u. Mart. Reise in Brasilien, IIter Theil, S.* 1326.

* *Yauarí* is the name of the palm *Astrocaryum javary*. The Portuguese form is Javarí.

† Called also manupé, or the yauarí. v. Martius gives the following etymology: "*Caa-cua: acapoc:* arbor fructu desiliente; *rana:* spurium," which strikes me as very fanciful.

‡ This may be a corruption of *ymyrá-apára-ỳ'ua*, meaning bow-tree.

§ *Kaá xingỳ'ua*, Lingoa geral.

‖ *Piráña ỳ'ua*, Lingoa geral, tree of the cannibal fish.

¶ *Taixí-ỳ'ua*, tree of the ant *taixí*, so called because its hollow leaf-stalks are inhabited by a very venomous ant. Taixí appears to be derived from *tasỳ'ua*, an ant, and *i*, little.

[1] *Ỳ'ua-puí*, slender tree.

only motion appearing to be that induced by the tides. Alligators swarm in it like tadpoles in a ditch, and I was not a little surprised to find them extraordinarily active, swimming rapidly about and coming up promptly to snap at an object thrown into the water. The banks of the river are alluvial, and go deeply under water during the rainy season.

After ascending the Yauarí for some distance we turned off northeastward into a smaller stream called the Marapí, on the left bank of which, not far from the mouth, is the cattle fazenda of Leocadio José Rodrigues, at which I was most hospitably entertained. This fazenda is built on a little knoll, surrounded on all sides by alluvial plains, which are partly open and covered with grass, the rest being forested.

The serra of Parauaquára is distant, as nearly as I can judge, about twenty miles to the eastward of the fazenda, and in plain sight, but I could find no one who had visited it, and it was even an object of superstitious fear, like the serra of Velha Pobre, which is to-day held to be haunted by a female spirit, to appease which boatmen hang offerings of rags and clothing upon the trees on the banks of the Amazonas at certain localities. I had some difficulty in obtaining guides for the journey, but Sr. Leocadio kindly furnished me with a negro and a mulatto, and my party was completed by three young Indians I had brought with me from Praïnha. We set out on foot with provisions and water for three days, for we were warned beforehand that we should find no streams on the route.

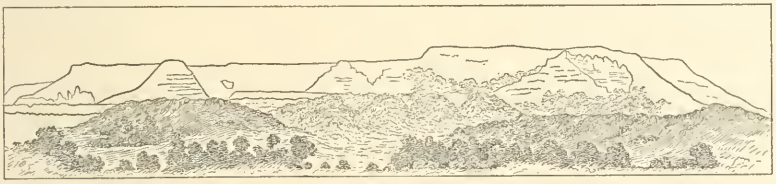
For two or three miles eastward from the fazenda our way was through wooded and marshy campos, until we reached a broad, level, open plain, used as a grazing-ground for cattle, in crossing which we were completely covered with myriads of minute carapáto ticks (Ixodes), from which we with difficulty rid ourselves, an episode that brought up vivid reminiscences and no *saudades* of the campos-land of Minos Geraes. The open plains, just described, are represented in Plate VII. by the irregular lake-like patch, near the Amazonas. From the grazing-grounds to Parauaquára, the country, though not high, is very rough, the topography appearing to have resulted from the denudation of soft beds, interstratified with which, are thin strata of hard, brown, ferruginous sandstone, blocks of which encumber the ground. A heavy fruit-growth, with jungles of the magnificent banana-like *pacúa-sor-*

oróca (*Phaenacospermum*) fills the wet valleys, but the higher grounds are a mixture, or more properly an alternation of campo and wood, the campos being thickly covered with high grass and scattered trees, while the woods are thick and dry. One tree in these woods especially attracted my attention. Only a few inches in diameter it grew like a giant withe, straight up above all the other trees, destitute of branches except at the top, where were only a few short ramifications. The Indians call it *kuatá kysáua*, or the hammock of the cuatá monkey.

The journey was exceedingly fatiguing, and in the woods we were obliged to use our knives incessantly, but what made our progress most painful, were the high grass and bushes filled with cariá, a long-leafed sword-grass that cuts like a razor. My heavy duck trowsers were soon cut out at the knees, and my hands and face were cut and bleeding, while the bare feet of my attendants suffered severely. Approaching the serra the topography became more and more irregular, and, just before reaching the mountain, we descended into a deep valley, through which flows a stream of delicious water, passing which we rose to a sort of isolated shelf at the base of the serra, where we passed the night. Next day we ascended by a sharp spur at the south-west corner to the summit.

Parauaquára* is an extensive, isolated plateau of circumdenudation, and apparently forms a long, narrow, irregular strip, running east-west; at least so it appeared to me from the river. The summit is so densely covered with little trees that I could not traverse it, and I consequently have seen only the western and southern sides of the serra.

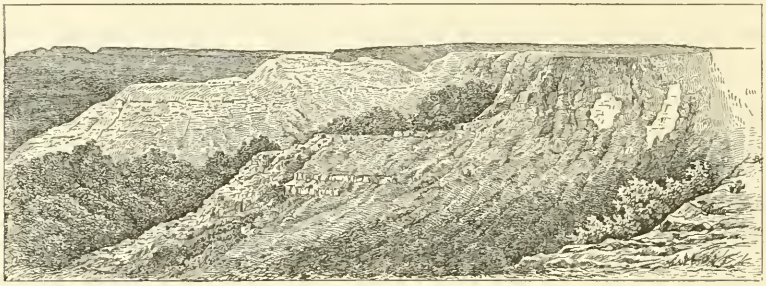
The following sketch, taken from a point a few miles west of the mountain, will show its topographical features as seen in elevation.



The following cut is from a sketch taken from the top of the serra looking off northward along the western side, showing the

* *Paruá*, parrot, and *quára*, hole.

level-topped summit, and the steep sides and spurs, along which run the edges of the horizontal strata like courses of masonry.



On the southern side of the serra, at the south-west corner, is an immense, concave, precipitous gulf like one-half of a volcanic crater, and on its sides a great thickness of rocks is exposed. The view on Plate VII. is from a sketch taken from the summit of the serra, just above the precipice, and looking westward across the gulf and the spur by which we ascended, out over the Amazonian valley. The sloping mass of Tauajurí is distinctly visible on the western horizon, while just to the south are the Monte-Alegre highlands between which and Parauaquára stretch immense plains, more or less completely covered with forest, with the exception of the campos near the Yauarí, which on the sketch look like a large lake. Far off to the north-ward these same wooded plains are continued to the long line of table-topped hills. They are rarely broken by a hill and there is but one little lake in sight. On the maps a large lake called Urubú-quára,* is represented lying between Tauajurí and Paráuaquará, but of this nothing is to be seen from the serra, the only lakes visible from this mountain or from Tauajurí being the little lagoon just spoken of, and which I have represented in my sketch, and the long, narrow, crescent-shaped lake lying between Monte-Alegre and Prámha.

The Amazonas bordered with forest, dotted here and there with islands, and enlivened by a white sail or a steamer, runs like a broad belt across the landscape, its reddish waters contrasting strongly with the green of the woodlands. We may trace it from the western horizon near Monte-Alegre, to far beyond Almeyrim. Parauaquára lies some ten miles, more or less, back from the river.

* *Urubú*, vulture. nd *kuára*. hole.

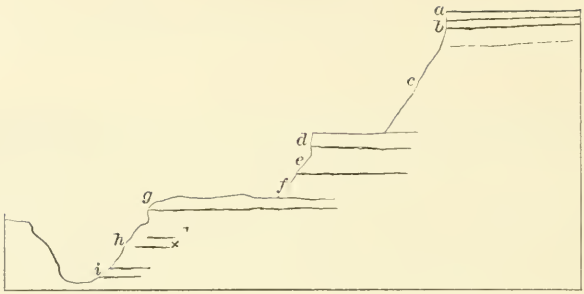
On the opposite side of the Amazonas, and to the south-west, immense alluvial plains with many large lakes stretch away to the dim, ill-defined horizon, but I could not make out the Xingú, which probably lies out of sight below the horizon.

The area of country one may survey from the top of Paranáquára is immense, and every topographical feature is seen as on a map. I could not but contrast the bird's-eye view from the serra, and the clear and comprehensive idea it gave me of this part of the Amazonian valley, with the meagre idea of the Amazonas one obtains by traveling by steam along the river, when all he sees is the broad turbid flood, bordered on each side by a strip of forest, with perhaps a few distant hills seen over the tree-tops; a few islands and a clear water horizon both in the east and west.

One traveling in this way sees actually nothing of the structural features of the valley, and he puts one in mind of an ant who makes an excursion up a Corinthian column following industriously along the bottom of a fluting.

The Amazonas has been "explored" quite sufficiently in this style, and the sooner travelers settle down to the conviction that the Amazonas, like the Mississippi or any other great river, is too big for one man to explore alone, even in a life-time, the better it will be for science. Mr. Chandless has set a good example to Amazonian travelers in his careful surveys of the Parú and of the Canumá, Abacaxí and Mané-Assú.

The following is a section made from the top of Paranáquára to its base. The exposures on the mountain side, are so poor and disconnected, and the sword-grass made the descent so painful that observations were made with difficulty, and I could not determine the thickness of the beds. The beds are given in the descending order.



a. The surface is covered with a few feet of a very fine, light brick-red earth consisting of a mixture of clay and very fine sand.

b. Red sandy clay packed full of nodules of iron-stone, which are elongate and stalactitic in form, and imbedded upright, so that the bed appears as if it were full of long, irregular roots. Thickness 8-10 feet.

c. Very heavy beds of Tauatínga clay of a grayish white color magnificently exposed in the cliffs on the south-eastern side of the serra, where they look white like chalk. These rocks are well bedded as seen in the sketch of the cliffs, but they are not laminated.

d. A thick bed of white clay, partly very pure Tauatínga, partly sand and often presenting a structure similar to that of a brick in which two kinds of clay have been imperfectly mixed together. The material of which this bed is composed bakes very hard in the sun, and, resisting denudation better than the overlying beds, it occasionally forms a projecting platform with bluff edges.

e. Soft, fine-grained sand-stone, white or cream-colored, and with a cement of clay.

f. Sandy clay, not laminated, variegated in color and irregularly solidified by iron oxide.

Leaving the serra and going eastward a short distance to a deep valley, the section appears to be continued as follows:

g. A heavy bed of a hard, fine and even-grained, white, argillaceous sandstone, beautifully variegated with bands and mottlings of delicate shades of red, purple, brown and yellow. This rock resembles very closely that of the little ridge just east of the igarapé of Ererê and may be of the same age; but, unfortunately, in the valley

of the Amazonas lithological characters are not much to be trusted in the identification of formations.

h. Series of beds not well exposed; at *x* are thin bands of coarse, red sandstone and iron-stone.

i. The lowest rocks seen were a thick bed of fine, very dark gray clay.

Not a single fossil was found in the Paranáquára beds, so that their geological age is undetermined. My own decided opinion that they are newer than the Cretaceous and probably of Tertiary must be taken for what it is worth, until the question is settled by palaeontological evidence.

The following paper by Mr. Rathbun on the Brachiopoda of the Devonian of Ereré is the result of a long and careful study of the collections under my direction. At my request Mr. Rathbun took a suite of the fossils to Cambridge, Mass., and compared them with the collection in the Museum of Comparative Zoölogy. Prof. Agassiz received him with the greatest kindness, and gave him every facility for the examination of specimens. I have also to express my thanks to Mr. T. Cary, business manager of the Museum, and to my old friend Prof. O. H. St. John, for aid rendered to Mr. Rathbun.

Prof. Hall has since kindly examined the collection, and I am much indebted to him for allowing Mr. Rathbun to compare the Brazilian fossils with New York types in his collection. My thanks are also due to Mr. Whitfield for his courtesy in aiding in these comparisons.

I have published a very condensed sketch of the geology of the Ereré-Paranáquára district in the Transactions of the American Geographical Society, and the sketch-map at the head of this paper first appeared in that volume, but is now republished with several important changes.

XXIII. On the Devonian Brachiopoda of Erere', Province of Para', Brazil

BY RICHARD RATHBUN,
Of the Geological Laboratory, Cornell University.

[*Read before this Society January 2d*, 1874.]

Terebratula Derbyana, *Hartt*, sp. nov., Plate X, figs. 15, 17, 18, 19, 20, 21, 22, 24 and 25.

Test small, generally subovate in outline, but sometimes subangular posteriorly, lenticular, with nearly equally convex and somewhat flattened valves. Breadth usually about three-fourths, though sometimes nearly equal to, the length, and greatest at or anterior to the middle. Surface smooth.

Ventral valve depressed-convex, with the greatest convexity posterior to the middle. The beak appears to be more or less pointed, slightly extended beyond the dorsal valve and incurved, with quite a broad deltidium beneath; but the external moulds, owing to the friable character of the sandstone in which they were taken, are all more or less defective in the umbonal region. The posterior lateral margins, diverging from the beak at an angle a little greater or less than a right angle, and slightly rounded or nearly straight, extend forward nearly half the length of the valve, when they bend gradually to unite with the lateral margins, which, together with the front, form a single regular curve.

Dorsal valve generally slightly elongate, but sometimes nearly circular in outline, depressed-convex like the opposite valve, the convexity strongest posteriorly, the curve from the beak to the front being very gentle.

The surface of both valves is smooth, though sometimes it is traversed by several more or less prominent concentric lines of growth.

There is neither fold nor sinus, and altogether the test presents a very plain appearance.

Length, 10 m. m., breadth, 7.5 m. m., thickness, 3 m. m.

This species occurs quite abundantly in the Devonian sandstone of Ereré, associated with *Streptorhynchus Agassizii*, *Vitulina pustulosa*, etc. Many specimens of different ages are often found crowded together in a small space in the friable portions of the sandstone, and preserved in the form of external and internal moulds.

In the absence of the muscular markings and loop, it has been impossible to determine with accuracy whether this species is a true *Terebratula* or not, since, so far as external form is concerned, it might belong either to *Centronella* Billings, or to *Cryptonella* Hall. Until more perfect material shall have been collected, I have thought it best to refer the species provisionally to *Terebratula*, the most largely represented by species of the above genera. (Morgan Expeditions 1870 and '71.)

Named by Prof. Hartt in honor of his assistant, Mr. O. A. Derby, instructor in Geology and Palaeontology in Cornell University, and his companion on two expeditions to the Amazonas.

Spirifera Pedroana, *Hartt,* sp. nov., Plate VIII, figs. 1–9, 13, 14 and 16–20.

Test of moderate size, inequivalve, very transverse, thin. Breadth varying from twice, to three and a half times the length, being greatest along the hinge line. Outline sub-semi-elliptical or broadly sub-triangular, the lateral margins on each side forming a single, more or less strong, regular curve, though they are sometimes nearly straight. Cardinal extremities more or less produced and angular, varying from quite acute to nearly rectangular, often slightly rounded. Test plicate.

Ventral valve much more convex than the dorsal, sub pyramidal when young, more or less ventricose when old. Greatest elevation at or just in front of the beak, which is small, elevated, generally slightly incurved, but sometimes hardly produced beyond the hinge area. Hinge area moderately broad, triangular, nearly flat or slightly concave, perpendicular to antero-posterior diameter or slightly inclined forwards or backwards, in which last case it is generally slightly concave, the curvature varying somewhat but always more marked under the beak. Cardinal margins angular, nearly straight or curving very slightly inwards. Fissure triangular with the width at base about equal to the height. Mesial sinus of moderate depth and width, broader than deep and increasing gradually in size towards the front, where it is slightly produced beyond the margin of the valve. It is regularly rounded in the bottom, though sometimes slightly flattened towards the front; its surface is smooth and the margins are well defined. From the beak to the front, along the mesial line, the surface of the valve curves moderately and regularly, but never very strongly; sometimes it is nearly straight. The slope from the margins of the sinus to the cardinal extremities is very slightly convex but often nearly straight.

Dorsal valve moderately convex but sometimes much depressed, the elevation being greatest near the middle. Beak minute. Mesial fold prominent and abrupt, moderately wide, its breadth increasing regularly from the beak to the

front; sides very steeply inclined, top rounded and flattened, with usually a very shallow, longitudinal furrow, exceedingly narrow at the beak, but broadening and disappearing on approaching the front. The summit of the fold, from the beak to the front, describes a moderately strong curve, which tends to become more or less straight towards the front. The elevation of the fold in front is quite variable.

The test has, on each side of the fold and sinus, 10 to 16 simple, rounded, prominent plications, the reverse plications being of the same form but narrower. On the ventral valve, the plications bordering the sinus are sometimes slightly larger than the others, and are well defined up to the beak. Towards the sides they gradually decrease both in width and prominence, sometimes dying out entirely on the cardinal angles, which are thus frequently left smooth, as is also a narrow space extending just in front of the cardinal margins, to within a varying distance of the beak. At the sides of the fold in the dorsal valve, the plications arch rapidly from the beak, curving strongly to the front, but less and less so as the cardinal angles are approached, where the valve is more or less flattened, the plications diminishing in prominence towards the sides as in the ventral valve, but seldom leaving the cardinal angles smooth. Sometimes the valves are marked, usually towards the front, by one, two or three, seldom four, prominent lines of growth, and some impressions of the fold and sinus show indications of many fainter ones.

The dental plates of the ventral valve are thin, divergent, generally very short, though in the older specimens they sometimes extend forward nearly one-third the length of the valve, each including two or three plications between itself and the sinus.

The specimens vary much in dimensions, one large one measures, length, 15 m. m., breadth, 36 m. m., depth, 12 m. m.; another, 15, 45 and 12 m. m.

The test must have been a thin one, for the exterior markings are very plainly impressed upon the inner mould.

This species belongs to the group of *Spiriferae*, with broad hinge area and more or less extended sides, which is so common in the Devonian; but the collections at command for comparison have been so meagre that its relations to other species have been but imperfectly determined. It resembles closely *S. varicosa* of the Corniferous limestone, from which, however, it differs in the greater number of plications, which are not angular, and also in the narrower hinge area. Many of the smaller and more mucronate varieties approach *S. angusta* of the Hamilton group in shape, but in the latter species the plications are smaller and more numerous. From the European Devonian *S. sub-cuspidata*, Schnur, it differs, among other features, in the much narrower hinge area.

Prof. Hall, who examined a small number of specimens of this species of *Spirifera* after the above description was written, thinks that in its different varieties it is very closely related to several American Devonian *Spiriferae: S. varicosa*, Corniferous limestone; *S. medialis*, Hamilton group, which varies much in form; *S. angusta*, Hamilton group, perhaps only a variety or young form of *S. medialis*; and *S. macra* of the Corn. l. s., which last species, however, has generally a narrower and more curved hinge area. *S. Pedroana* therefore appears almost like a connecting link, uniting the above named species in a single series.

This *Spirifera* is one of the most common and beautiful fossils in the Devonian sandstones at Ereré, probably coming next to *Streptorhynchus Agassizii* in abundance. So far as is at present known, it is almost entirely, if not quite confined to the sandstone. But a single very small ventral valve of a *Spirifera* has been found in the underlying shale, which agrees with the species just described in general outline; it is, however, a little narrower, and appears to have a small median septum which would ally it with *Spiriferina*; but this last character is obscure in the specimen, and cannot be relied on. (Morgan Expeditions 1870 and '71.)

[I have taken the liberty to dedicate this beautiful and interesting species to His Majesty, the Emperor of Brazil, an accomplished geological observer, and one whose distinguished patronage and sympathy many a scientific traveler in Brazil will remember with the deepest gratitude.—C. F. H.]

Spirifera Elizae, *Hartt*, sp. nov., Plate VIII, figs. 15 and 21; and Plate IX, fig. 22.

Of this species only the ventral valve is known. This is of medium size, transverse, the breadth being about twice the length; nearly semicircular in outline, the sides and front forming a very regular curve, indented only slightly in front by the depression of the sinus; depressed sub-pyramidal in form, most elevated in the umbonal region. Beak obtusely angular, elevated, not produced beyond the hinge area in the internal moulds. Hinge area triangular, slightly concave and inclining a little backwards; cardinal margins angular; fissure triangular. From the margins of the sinus the valve slopes on each side with scarcely any curvature to the cardinal extremities, but from the beak to the front it curves slightly, the sides of the valve presenting there

fore a flattened appearance. Mesial sinus extending to the beak, moderately deep and wide, regularly rounded in the bottom, and, at the front, less than one-fourth as deep as wide.

Surface of test with twelve or more low, very indistinct, rounded, radiating plications on each side. These are rather more pronounced near the sinus, but gradually disappear towards the sides.

The impressions of the dental plates, in the interior mould, start quite near together at the beak, and extend, parallel with and exterior to, the diverging margins of the sinus, nearly or quite to the front of the valve, the space between the dental plates and the margins of the sinus including one or two plications. In one specimen, Plate VIII, fig. 21, one plication is included in this way on one side, and two on the other.

The type specimen, a ventral valve, is 17 m. m. long, 34 m. m. broad and about 5 m. m. high.

This species is based on more or less perfect specimens of four ventral valves, of which three are internal moulds, and the fourth an impression of the exterior surface. Though these agree sufficiently well together to warrant the conclusion that they belong to the same species, there are, however, some points of difference between them.

The surface in all the above specimens is nearly smooth, and the dental plates are always long, reaching almost to the anterior margin of the valve. The specimen taken as the type is very regular, the margins of the sinus and the bases of the dental plates are straight; but in some of the other specimens the margins of the sinus are irregular, curving more or less, and the sinus is narrower, with the dental plates removed farther from its margins. These variations do not seem to be produced by distortion, but they might be due to irregular internal thickening. This question, together with that of the thickness of the test, cannot be determined from the present condition of the casts.

In shape this species somewhat resembles *S. Pedroana*, with which it is associated at Ereré; but it is easily distinguished from that species by the very long dental plates and the nearly smooth surface. On comparing it with those varieties of *S. disjuncta*, Sow., which have long dental plates, as represented by Prof. Hall; Pal. N. Y., Vol. IV, Pl. 42, Fig. 17, and Pl. 63, Fig. 14, there is seen to be a great resemblance, but all the specimens of *S. Elizae*, which show plications on the sides have a perfectly smooth sinus, and this is the case in the external as well as in the internal moulds.

Associated with *Sp. Pedroana*, in the Devonian sandstones of Ereré. (Morgan Expedition 1871.)

[Dedicated respectfully to Madame Elizabeth C. Agassiz.—C. F. H.]

Spirifera Valenteana, *Hartt*, sp. nov., Plate VIII, fig. 11.

Test above medium size, ventricose, thick, trilobed in outline and slightly transverse, with the greatest width along the hinge line.

Ventral valve very convex, most elevated between the beak and the middle. Cardinal angles depressed, with the cardinal margins concave. Beak probably large and curving over a rather constricted area. The margin of the valve is distinctly trilobed, caused by the extension forward of the broad mesial sinus beyond the general margin of the valve; leaving the cardinal extremity on one side at nearly a right angle, it curves regularly inward for more than one-half the whole length of the valve and one-fifth the width, when it gradually bends outward, forming a shallow reëntrant curve before reaching the forward projection of the sinus, around which it extends in an elliptical curve. The distance across, from the center of one reëntrant curve to the other, is about twice the length of the prolongation of the sinus beyond the general margin of the valve. Mesial sinus very broad and shallow, regularly rounded in the bottom, and with its margins undefined; width of sinus nearly one-half the width of the valve, the whole anterior lobe of the valve being occupied by it; in the cast it is nearly as broad near the beak as at the front. The surface of the valve curves regularly and quite strongly from the beak to the front margin; from each side it curves rapidly upward for about one-fourth the width, and then descends gradually to form the sinus, which is very slightly and regularly concave.

The dental plates, as indicated by the moulds, were very high and thick behind, thinning out gradually as they advance. They are widely separated, the distance between them being nearly one-third the width of the valve, and they extend forward, parallel with each other, for two-thirds the length of the valve.

Between the dental plates in the mould are indistinct impressions of muscular markings, consisting of an ovate, slightly depressed space, rounded behind, where it is immediately enclosed by the dental plates, and gradually narrowing to a point anteriorly, not extending as far forward as the dental plates. This impression seems, however, too limited to include all the muscular markings of the ventral valve.

But one specimen of this singular species, a cast of the interior of the ventral valve, has been found, and though peculiar in shape, it appears to belong to the genus *Spirifera*. The test was very heavy, and, including the dental plates, was much thickened by

internal growth, while the whole interior of the beak was filled up. The surface of the mould is smooth, and does not enable us to decide whether the test was ornamented or plain.

The single specimen measures as follows: length about 25 m. m., breadth about 34 m. m., height about 7 m. m.

From the Devonian sandstone of Ereré, found with *S. Pedroana* and *S. Elizae*. (Morgan Expedition 1871.)

[I have named this species in honor of Capitão Valente, of Monte-Alegre, a gentleman to whom I am under the deepest obligations for hospitality, and for most important aid rendered me in my explorations of the Ereré-Monte-Alegre district.—C. F. H.]

Cyrtina? Curupira, *Rathbun*, sp. nov., Plate X, figs. 1 and 6.

Ventral valve unknown. Dorsal valve small, moderately or very convex, and most elevated just behind the middle, transverse, sub-semicircular in outline, with the breadth nearly or quite twice the length, and apparently greatest along the straight hinge line; but the cardinal extremities in all the specimens are defective, making it impossible to determine whether they are angular or slightly rounded. The sides curve moderately, and the anterior margin is nearly straight in front of the fold. From the front, along the median line, the valve rises more or less rapidly, with quite a strong curvature, for two-thirds or three-fourths its length, and then descends in an abrupt curve to the hinge line, there being no apparent beak. Median fold moderately elevated above the surface of the valve, broad, and composed of three plications, of which the two outer ones are very prominent and regularly rounded, the median one being broader but not so high, and slightly flattened along the top. The fold commences near the hinge line, where it is moderately broad, increasing gradually in width towards the front, but seldom gaining much in height. The sides of the valve slope off more or less abruptly towards the cardinal angles, which are broadly flattened. On each side there are generally three rounded plications, not so large as those on the fold, and sometimes much depressed; they are usually narrower than the reverse plications, and increase gradually in width towards the margins, diminishing, however, in size towards the cardinal angles, which last are smooth.

At first sight, the specimens on which the above species is founded, might be taken for dorsal valves of *Vitulina pustulosa*, with which species it is associated in the Devonian sandstone at Ereré; but, as the above description shows, it is very different. Without the ventral

valve it is impossible to determine the genus accurately; but the specimens resemble closely the dorsal valves of a *Cyrtina*, though the fold is different from that of any described species. In this latter feature the species resembles *Cyrtina? amblygona*, Phil. Subcarb. Eng. (Davidson, Pal. Soc.), and I have therefore referred it provisionally to the same genus. It seems very strange that while dorsal valves of *C.? Curupira* have been found, not a single ventral valve has yet been detected.

Prof. Hall, who examined the specimens, thought that they might prove to be something besides *Cyrtina*, but was in doubt as to their generic affinities. They have much the appearance of a *Spirifera*, but one specimen seems to be marked, though very indistinctly, with fine, radiating, raised lines, a character which is unknown in any *Spirifera*, plicated as this one is. (Morgan Expeditions 1870 and '71.)

It receives its name from Kurupíra, Lingoa Geral, a forest spirit of Tupi mythology.

Retzia* Jamesiana, *Hartt*, sp. nov., Plate X, figs. 23 and 27–38.

Test small, longitudinally suboval in outline, more or less angular posteriorly, with the greatest width near the middle. Proportions of length to breadth variable; breadth usually nearly equal to, sometimes three-fourths the length. Ventricose, occasionally flattened and lenticular; ventral valve more convex than the dorsal. Beak of ventral valve extended beyond the dorsal valve. Valves plicated.

Ventral valve quite regularly convex, the greatest elevation being at or just behind the middle. The curvature from the front along the median line is usually very regular and moderately strong up to the beak, along which it is slightly more abrupt. From side to side the valve is very strongly convex, and, rising rapidly from the lateral margins, generally with slight curvature, it is regularly and well rounded on the median line. Beak projecting considerably beyond the dorsal valve, and rather strongly arcuate. The posterior lateral margins of valve diverge at an angle, varying from a little more to a little less than a right angle; they may be slightly convex or nearly straight, but are generally somewhat concave for a short distance, when they bend round and join the lateral margins, which, together with the front, form a regular curve equal to a little more than a semicircle. Surface marked by 14–20 low, rounded,

* Mr. R. P. Whitfield writes me that "the genus *Rhynchospira* will have to be dropped entirely, as *Retzia Adrieni*, Vern., appears to be generically the same as *R formosa*, Hall's type of *Rhynchospira*."

simple, radiating plications, separated by slightly narrower, rounded depressions. The plications, which are very distinct at the front, extend backwards from one to two-thirds the length of the valve, when they disappear, leaving the entire unbonal region smooth. The depression, occupying the median line, is about twice as wide as the others, but only slightly deeper, and extends nearer to the beak. It is flattened along the bottom, and very rarely includes a slight fold in the middle. The plications on the sides of the valve do not vary much in size, those bordering the central depression being only slightly larger than the others. Thin dental plates, starting on each side of the beak, and diverging but slightly, extend forward along the valve for about one-fifth its length.

Dorsal valve sub-circular in outline, sometimes a little angular behind, more or less depressed-convex, sometimes very much depressed, with the greatest elevation behind the middle. Beak sharp, its margins forming nearly a right angle, depressed, and appearing not to project beyond the hinge line. The plications of this valve correspond in number and character to those of the opposite valve, being distinct on the front, while the posterior part of the valve is smooth. The plication occupying the median line is slightly enlarged, corresponding to the median depression in the ventral valve. It is flattened on the top, scarcely more prominent than other plications, but extending nearer to the beak.

The largest specimen obtained, a ventral valve, measures, length 11 m. m., breadth 10 m. m., height 3 m. m.

This species occurs very abundantly in the Devonian sandstone at Ereré, associated with *Streptorhynchus Agassizii*, etc. The area, deltidium and loop, are not preserved, but from external features it appears to approach more nearly to *Retzia* (*Rhynchospira*) *lepida*, Hall, Hamilton group, than any other species; but I have no specimens for comparison. In ornamentation it resembles *Retzia radialis*, Phil., Carb., Eng. The plications in *R. Jamesiana*, however, are smaller, but the median plication on the dorsal valve, and the corresponding sinus on the ventral valve, are enlarged as in *R. radialis*.

The extension of the dental plates to the bottom of the ventral valve in the new species, is very distinctly shown in some of the interior moulds, a character which, hitherto, has seldom been found in any species of *Retzia;* but it is not safe to decide on its value until the interior of *Retzia* is better known. (Morgan Expeditions 1870 and '71.)

[In dedicating this species to my old friend, Maj. O. C. James, of Rio de Janeiro, I desire to express my deep feeling of gratitude, for

his generous aid towards fitting out three different expeditions to Brazil, and for his constant, warm sympathy with my scientific pursuits.—C. F. H.]

Retzia Wardiana, *Hartt,* sp. nov., Plate X, figs. 2–5, 8, 9, 11, 12, 14 and 16.

Test small, double convex, more or less ventricose, the ventral valve being usually the more convex; longitudinally suboval, slightly angular behind; usually a little longer than wide, though the width sometimes equals the length, greatest width near the middle; whole surface finely plicated.

Ventral valve most convex near the center, curving regularly and moderately, sometimes quite strongly, from beak to front, and very strongly from side to side. Beak more or less pointed and slightly incurved. Posterior lateral margins of valve straight, slightly convex or concave, including an angle equal to, or a little more than, 90 degrees. The front and lateral margins together form a little more than a semicircle. The bases of the dental plates are parallel and extend very slightly forward, the distance between them being nearly one-fourth the width of the valve.

Dorsal valve nearly circular in outline, sometimes a little elongate, generally slightly and regularly convex, the beak being much depressed.

Each valve is ornamented by from 14-20 (in one case 22,) simple, narrow, rounded, or subangular, very prominent, radiating plications which extend over the whole surface, being traceable from the beak, where they are very narrow, to the front, towards which they gradually increase in width and prominence. These plications do not differ much in size, being only a little smaller towards the lateral margins than in the middle. The depressions separating the plications are narrower than they, and rounded or angular.

A medium sized ventral valve measures, length 10 m. m., breadth 8 m. m., thickness about 3 m. m.

This species occurs quite abundantly in the Devonian sandstones of Ereré, associated with *R. Jamesiana,* which last is, however, much more common. The two species resemble one another closely in size and general form, but they differ totally in ornamentation, the difference being so marked that the species are readily distinguished, even by fragments of valves; moreover, no intermediate forms have been observed. *R. Jamesiana* always has low, indistinct plications not extending to the beak, while those of the species just described are always very prominent, extending from the beak to the front. The enlarged median plication and depression are also a constant character of *R. Jamesiana.* (Morgan Expeditions 1870 and '71.)

[I have attached to this pretty species the name of my old friend, Mr. Thos. Ward, the explorer, of the Tocantins on the Thayer expedition, and one to whom I am under a deep debt of gratitude for aid in my first journey to the Amazonas in 1870.—C. F. H.]

Rhynchonella (Stenocisma) dotis, *Hall,* (Palaeontology of New York, Vol. IV, p. 344,) Plate VIII, figs. 10 and 12.

Of the Ereré form the ventral valve is unknown.

Dorsal valve rather below the medium size, of moderate convexity, which is stronger towards the front, quite flattened near the middle; slightly transverse with the greatest width midway between the beak and the front; very short-ovate in outline, slightly truncate in front, and angular behind. The nearly straight posterior lateral margins diverge at an angle of about 110 degrees, and extend less than one-third the length of the valve, the lateral margins rounding quite strongly and regularly to the edge of the fold, in front of which the margin is nearly straight. From the depressed beak the valve rises quite abruptly for a short distance along the median line, and then continues with a very gentle curve, or nearly straight, to the front. On each side, it rounds up strongly for one-fourth the width or more, and is nearly flat in the middle. The mesial fold commences just anterior to the middle, and increases very gradually in width, being but slightly prominent at the front. The valve has about 16 plications, of which four occupy the fold. The plications are prominent, varying in width, being usually rounded near the middle of the valve, but becoming angular towards the sides, with the reverse plications generally narrower. The first one or two on each side next the fold extend nearly directly from the beak to the margin, the others, in succession, curving more and more strongly outward toward the lateral margins, and decreasing in size, those on the extreme sides being very small and angular. A narrow septum extends forward from the beak, for about one-third the length of the valve.

The most perfect specimen measures, length 11 m. m., breadth 13 m. m., height about 3.5 m. m., width of fold in front about 5 m. m.

This small species of *Rhynchonella* is probably identical with *R. dotis*, Hall, Hamilton group, N. Y. The specimens from New York vary much in the character of the plications, which are sometimes very angular, and at others well rounded. In the Brazilian specimens, so far obtained, the plications are of an intermediate character.

From the Devonian sandstone of Ereré, Prov. do Pará, Brazil, obtained with *Streptorhynchus Agassizii*, *Retzia Jamesiana*, etc. (Morgan Expeditions 1870 and '71.)

Orthis Nettoana, *Rathbun*, sp. nov., Plate X, figs. 7, 10 and 13.

Test very small, with the valves unequally convex. Ventral valve sub-circular in outline and longer than the dorsal, owing to the greater extension of the beak. Dorsal valve broadly sub-elliptical in outline, slightly straightened posteriorly, with the breadth greatest across the middle, and about one and one-fourth the length. Breadth at hinge line apparently about two-thirds the greatest width of the test; cardinal extremities rounded; both valves marked with very fine radiating raised lines.

Ventral valve very convex, and most prominent just behind the middle. From the beak, which is elevated and acute, the surface of the valve curves slightly upwards, and then slopes to the front with a regular and gentle curve. Towards the sides the slope is more abrupt and slightly convex. Hinge area rather high, triangular, with a large fissure.

Dorsal valve slightly convex, broadly flattened in the middle, and often more or less depressed along the median line, in a wide, undefined sinus, extending two-thirds the length of the valve or more from the front, with its width in front one-third to one-half the greatest width of the valve. Beak depressed.

The impressions of the dental lamellae in the ventral valve diverge slightly in extending forward, the distance between them being about one-fifth to one-fourth the width of the valve, and their length, about one-fourth that of the valve. The socket plates in the dorsal valve left similar impressions.

The raised lines, ornamenting the valves, are exceedingly fine, rounded and thread-like, closely arranged together, and seem to increase both by intercalation and bifurcation.

The largest ventral valve measures, length and breadth, each about 6 m. m., height nearly 2 m. m. The largest dorsal valve has a breadth of 7.5 m. m., a length of about 5 m. m., and a height of nearly 1 m. m.

This is a very small species of *Orthis*, being of about the same size as *Orthis lepidus* of the Hamilton group, but differing totally from it in shape. It can be easily distinguished from the young of *Streptorhynchus Agassizii*, with which it is associated, by the much finer radiating, raised lines, and by the extension forward of the dental plates in the ventral valve, and the socket plates in the dorsal valve.

From the Devonian sandstone of Ereré, where it is moderately abundant. (Morgan Expeditions 1870 and '71.)

Dedicated to Dr. Ladisláu Netto, the distinguished director of the Muzeu Nacional at Rio de Janeiro.

Streptorhynchus Agassizii, *Hartt*, sp. nov., Plate IX, figs. 3, 4, 10, 16, 17, 23, 25, 26 and 28-30.

Test small or of moderate size, never very large, transverse, double convex, or with the ventral valve sometimes slightly and irregularly flattened, or even concave towards the front. Valves subequally convex, varying much in outline; sometimes unsymmetrical; often circular, with the sides and front forming a segment of a more or less perfect circle, embracing two-thirds to three-fourths the diameter; in some cases sub-elliptical; seldom transversely oblong. Greatest width at or a little behind the middle. Cardinal extremities rounded or obtusely angular, but in a single known instance slightly extended into mucronate points. Proportions of length to width about as 2 to 3, 3 to 4, or 3 to 5. Hinge line straight, beak of ventral valve elevated and pointed, that of dorsal valve being depressed and broadened. In size, the test varies from very young and small to 21 m. m. long, by 32 m. m. broad, and one unusual specimen measures 29 m. m. long by 40 m. m. broad. Surface ornamented with very fine raised lines.

Ventral valve most prominent at, and in the neighborhood of the beak. Extremity of beak generally elevated above the rest of the valve, with the surface of the valve sloping more or less irregularly towards the sides and front, and either straight, slightly concave or somewhat convex; or the beak may be a little depressed, the surface rising from it for a short distance, and then continuing to the front and sides as in the former case. In a few exceptional instances, the valve is regularly and strongly convex, from the beak nearly to the front; but the general tendency in all specimens is, for the surface to flatten out toward the front and sides. Beak acute, seldom perfectly symmetrical, generally bent a little to one side or the other, or slightly twisted; never extending much beyond the hinge area, and incurving but little. Hinge area nearly or quite as long as the hinge line, of moderate width, trianangular, inclined backward, and with the cardinal margins acutely angular. The area is never symmetrical in outline, and its form varies as the beak is bent or twisted. The cardinal margins are generally concave, though they vary in degree of curvature in the same specimen, and may be slightly convex on one side of the beak, and concave on the other. In extending towards the cardinal extremities, they generally bend more or less abruptly towards the hinge line, sometimes approaching quite near to it at some distance from the extremities, so that the hinge area may be very narrow at the sides, and appear as if quite short. The surface of the valve sometimes arches up quite rapidly on the sides, from the cardinal margins, for a short distance. Fissure of moderate size, triangular, the width at base equal to or slightly exceeding the height, covered by a very convex deltidium. The impressions of the dental plates in the internal moulds are visible only on the hinge area, at the sides of the fissure, appearing as shallow depressions not extending forward into the valve.

Dorsal valve more symmetrical than the ventral, the convexity being either moderate, or strong and regular, though sometimes the valve is more or less depressed-convex, or flattened in the middle, often with a tendency to form a shallow, undefined depression or sinus, commencing a short distance in front of the beak, and extending towards the front margin, broadening gradually at the same time. This sinus is found only in the more depressed specimens, and, when deepest, it forms only a slight undulation of the surface. The valve is most prominent at or posterior to the middle; in the former case, the curve from the depressed beak to the front is very regular, but in the latter case, it arches up somewhat rapidly from the beak, and then slopes off more gradually towards the anterior margin. Across the middle of the valve, from side to side, the curve is seldom regular, the surface generally rises with but little curvature for a varying distance from the margin, and then extends straight across the center, or, if the specimen have a sinus, it is there slightly depressed. The cardinal extremities are more or less flattened, and this flattened area sometimes extends along the cardinal margins, narrowing to a point near the beak. A line from the cardinal extremities to the middle of the valve, forms a slight sigmoid curve. Beak depressed and not extending behind the hinge line, which is straight, and, in a single instance, slightly extended beyond the sides of the valve. Cardinal process small, thin, bifid above, with the two small processes on each side projecting backwards. A small projection in the center below, extends a little forward and towards the ventral valve. Socket plates short, thin, very divergent, forming an angle of about 135 degrees.

The surface of both valves is marked by very fine, rounded, thread-like or sharp, raised lines, increasing in number by intercalation, and probably in some cases by bifurcation also. The interspaces are slightly flattened and broader than the lines. One set of raised lines commences at the beak and extends to the margin, each line being exceedingly minute at the beak, but increasing very gradually in size. The intercalating lines generally begin to come in posterior to the middle, and thence, to the front and sides, new ones are continually being added, until the number at the margin is about double that near the beak, there being generally but one intercalating line for every interspace commencing at the beak. In some specimens concentric lines of growth are faintly preserved.

There seems to be no limit to the degree of variation which a species of *Streptorhynchus* may assume. It may be symmetrical in some specimens and unsymmetrical in others. The margins may differ much in outline, and the hinge area vary in width from a few lines to several inches. The beak may or may not be extended, and turned and twisted to an enormous extent, and the surface markings may be fine or coarse. Thus we have no limited and

definite characters, on which to form species, and it is only by comparing together very large collections of specimens, that we are enabled to determine specific relations.

Davidson is inclined to acknowledge but one species of *Streptorhynchus* from the Devonian and Carboniferous of Europe, and Prof. Hall has also united the numerous Devonian forms of America under one specific name. But from the descriptions given by these two noted Palaeontologists, and from the specimens at command for comparison, there seems to be as much difference between the Ereré forms, and *S. crenistria* or *Chemungensis*, as exists between the latter two species themselves.

In *S. Agassizii* the raised lines are always very fine, regular, and, almost without exception, arranged closely together. The beak is never much extended, twisted or turned to the side, and the hinge area retains about the same width in all the specimens, never being wide, while altogether the test is never very unsymmetrical.

It is true that these characters may seem to be varietal, but they obtain through all the specimens collected at Ereré, which amount to over 500 in number, more or less perfectly preserved, all of which have been carefully compared with one another.

Devonian sandstone of Ereré. (Morgan Expeditions 1870 and '71.)

[This species, the most common of the Ereré fossils, I have dedicated to my honored teacher, Prof. Agassiz.—C. F. H.]

Chonetes Comstockii, *Hartt*, sp. nov., Plate IX, figs. 5, 14, 18, 19 and 31.

Test rather above the medium size, depressed-concavo-convex, transverse, with the breadth one and one-half to one and three-fourths the length, and greatest along the hinge which is straight. The cardinal extremities are acutely angular, and, though always defective, are sometimes probably slightly produced, as is shown by the lines of growth on one or two specimens. The outline is somewhat sub-quadrate; the lateral margins, slightly rounded, extend forward, nearly parallel with one another, for about one-half the length of valve, when they bend rapidly round to unite with the anterior margin, the outline of which is more or less gently convex.

Ventral valve very slightly convex, generally most prominent just posterior to the center, whence it slopes with slight curvature to the front, the curve from the same point to the beak being more rapid. Across the valve, from side to side, the curvature is gentle and more or less regular, the sides towards the cardinal angles being usually more or less, sometimes very much, flattened.

Beak very small, depressed to and hardly projecting beyond the hinge area, which is narrow, linear, and apparently as long as the hinge line. Median septum in the interior very small and short, about one-fourth the length of the valve. Associated with one of the interior moulds, is the impression of a single spine, which is nearly two-thirds as long as the valve, very slender, and about the same size throughout the part preserved.

Dorsal valve imperfectly known. In the collection from Ereré is a single interior mould of the dorsal valve of a *Chonetes*, that appears to belong to this species. It is slightly concave, but the margins are broken away. The cardinal process is only sufficiently preserved to show that it is divided through the middle, and extends inwards and slightly backwards. The median septum is faintly indicated, as are also the backward extensions of the vascular impressions near to it on each side. The muscular impressions are not preserved.

There is the exterior mould of the dorsal valve of another and a much larger specimen, which probably also belongs to this same species. It measures 38 m. m. in breadth by about 21 m. m. in length, and is proportionately more convex than the other specimens, but the outline appears to be the same. The surface markings are not preserved. The impression of the hinge area of the ventral valve lies behind it, showing, that, when the specimen was imbedded, the two valves were joined together. At the fissure, which is small and triangular, the area is 2 m. m. broad, but it narrows gradually towards the cardinal angles. It lies nearly in the same plane as the margins of the dorsal valve.

The test is marked with very fine raised lines, which are low and rounded, but, from their imperfect preservation, the manner in which they increase in number can not be determined. There are about fifteen of the lines within a space of 5 m. m. near the front.

Two ventral valves measure as follows: length 17 m. m., breadth 26 m. m., depth nearly 3 m. m.; and 12 m. m , 21 m. m. and about 2 m. m.

This is a pretty species, resembling much *Chonetes coronata*, Con. Hamilton group, New York and Western States; but it differs from that species in having longer spines, not extending so obliquely backward.

Moderately abundant in the Devonian sandstone of Ereré, associated with *Streptorhynchus Agassizii*, *Vitulina pustulosa*, etc.

[Named in honor of Prof. T. B. Comstock, photographer to the Morgan Expedition in 1870.—C. F. H.]

Chonetes Herbert-Smithii, *Hartt*, sp. nov., Plate X, figs. 39–42 and 44–47.

Test small, concavo-convex, transverse, semi-oval or broadly semi-elliptical in outline. Width greatest at the hinge line, and equal to about one and one-third the length. Cardinal extremities forming nearly right angles; the

lateral margins, nearly straight, or gently convex, extending forward one-half the length of the valve or more, and then forming, with the anterior margin, a very regular curve around the front.

Ventral valve moderately convex, usually with the greatest elevation just behind the middle, whence, with a regular curve, it slopes more or less rapidly to the front. Towards the beak it curves quite abruptly, while across the middle the curvature is moderately strong and regular. In a few instances, however, the valve is most prominent in the middle. The sides curve slightly inwards towards the cardinal angles, which are flattened or slightly reflected, making the curve thence to the center of the valve slightly sigmoidal. Beak much depressed, with the small, acute apex scarcely projecting beyond the hinge area. Septum small and about one-fourth as long as the valve. The number and length of the spines is unknown. The impressions of a portion of two of them are preserved, with the exterior mould of one specimen; these are slender, and diverge obliquely outwards from the cardinal margin, their length being about one-fourth that of the valve.

Dorsal valve varying from moderately to very slightly concave, most depressed towards the front, and rising gradually towards the hinge line, along which, and at the cardinal angles, the valve is often flattened.

The raised lines, with which the valve is ornamented, are small and rounded, and increase very slightly in size towards the front, where they number from 15 to 23 or more. But from the imperfect preservation of the moulds in the sandstone, the lines are always obliterated on the sides and the posterior part of the test, while, in many cases, the whole test is thus rendered smooth.

One specimen of ordinary average size measures 7 m. m. in length, 9.5 m. m. in breadth, and 2 m. m. in height.

This species, in its typical forms, seems to be related to *Ch. armata*, Bouch., Dev. Inf., Boulonnais, France, with specimens of which I have very carefully compared it. The Brazilian species is, however, a variable one, and the radiating lines are always coarser, and, when well preserved, are more prominent than in *C. armata*. The ventral valve of *C. armata* is also generally more elevated.

The specimens of *C. Herbert-Smithii*, on which the ornamentation is well preserved, resemble somewhat in general appearance both *C. deflecta*, Hall, and *C. laticosta*, Hall, of the Corniferous and Hamilton groups; but a close examination shows that, in shape, the Ereré species differs entirely from those of New York. The beak of the former species is always much depressed, while in the latter it is prominent, the whole umbonal region of the test being much elevated.

Obtained from the Devonian sandstone of Ereré, where it is very abundant, occurring with *Vitulina pustulosa*, *Spirifera Pedroana*, *Retzia*, etc. (Morgan Expeditions 1870 and '71.)

Named in honor of Mr. Herbert H. Smith, one of the assistants on the Morgan Expedition of 1870.

Chonetes Onettiana, *Rathbun*, sp. nov., Plate X, figs. 43 and 48.

Test below medium size, gibbous, transverse, semi-elliptical in outline, with the width probably greatest along the hinge line, and equal to about one and one-third or one and one-fourth the length; anterior margin not very strongly rounded.

The ventral valve is very convex, being well rounded from the beak to the front; most prominent at or just in front of the middle, where it is very slightly flattened. The valve rises more or less rapidly from the sides, in a curve which becomes a little straightened across the middle. The sides are somewhat flattened towards the cardinal angles, which last are slightly reflected. Beak small, depressed, with the minute apex projecting but slightly beyond the hinge line. Median septum small and well defined, about one-fourth as long as the valve.

Dorsal valve unknown.

The interior moulds are ornamented with fine, radiating, raised lines, but very indistinctly preserved on the specimens obtained. Length 11 m. m., breadth about 15 m. m.

From *C. Herbert-Smithii* this species is easily distinguished, by its larger size and the finer radiating lines. It may prove to be a variety of *C. scitula*, Hall, Hamilton group, New York, but the specimens of *C. Onettiana* are larger than those of *C. scitula*, and differ from them in many details.

Associated with *Spirifera Pedroana*, etc., in the Devonian sandstone of Ereré. (Morgan Expedition of 1871.)

Dedicated, at Prof. Hartt's suggestion, to Senhor Onetti of Monte-Alegre, to whom he is much indebted for aid rendered in his Expeditions of 1870 and 1871.

Chonetes ....., Plate IX, fig. 24.

There was obtained from Ereré, a single specimen of a ventral valve of *Chonetes*, of about the same size as the last species described, which differs from it, however, both in shape and in ornamentation.

Ventral valve below medium size, moderately convex, transverse, with the proportions of length to breadth about as 3 to 4; hinge line equal to the greatest width of test; cardinal extremities apparently acute-angular. The valve is most elevated just posterior to the middle, whence to the front the surface extends in a moderate slope, and is slightly curved, but towards the beak it is more strongly curved. The valve curves regularly and moderately strongly across the middle, becoming very slightly flattened towards the sides. The cardinal angles are also somewhat flattened. The inner mould of the valve is marked by small, subangular, radiating, raised lines, which, on the single specimen obtained, are only preserved towards the margins. The lines are separated by rounded depressions of equal or slightly greater width. Length of specimen 9 m. m., width on the hinge line 13 m. m.

This specimen of *Chonetes* is undoubtedly different from any of the three species of *Chonetes*, described in the preceding pages; but since only a single specimen has been found, and that is not a very perfect one, I have thought it best not to give it a name until better material has been obtained for illustrating the species.

Tropidoleptus carinatus, *Con.* (*Sp.*) Plate IX, figs. 1 and 9, and Plate X, fig. 26.

Strophomena carinata, Con. Ann. G. R. of N. Y., 1839, p. 64.
Leptaena laticosta, Hall, 1843.
Leptaena laticosta, of Owen and others.
Tropidoleptus carinatus, Hall, 10th Rep. St. Cab. N. Y., 1857, p. 151.
Genus *Tropidoleptus*, Hall, 12th Rep. St. Cab. N. Y., 1859, p. 31.
Leptaena laticosta, of several European geologists.

Description of Ereré forms:

Test of medium size, plano-convex, transverse, semi-elliptical in outline, sometimes slightly straightened in front, with the breadth about one and a third to one and a half times the length, and greatest along the hinge line which is straight. Cardinal angles slightly acute. Surface plicate.

Ventral valve moderately convex, most elevated midway between the beak and the center, whence it curves rapidly backwards, sloping to the anterior margin along the middle with a very gentle curvature. From the flattened cardinal angles, the surface rises gradually on each side, being slightly concave for a varying distance (one-half the width of the side or less), when it curves regularly across the median line, very strongly on the posterior half, but less and less so anteriorly. There is thus formed behind the center a sort of undefined prominence, that broadens rapidly towards the front, gradually flattening out and blending with the general curvature of the valve. Beak small, quite strongly arcuate, and slightly extended beyond the hinge line in the interior

moulds. Hinge area very narrow, with the cardinal margins concave. Dental lamellae prominent, placed at right angles to one another.

Dorsal valve flat or very slightly concave, represented by only a single fragmentary specimen, preserving the interior processes in too imperfect a condition for description.

On each valve there are about 14 to 16 low, rounded, often obscure, radiating plications, of medium size, generally broader than the reverse plications, though frequently equaling them in width. They are smaller, and sometimes more distinct near the beak than at the front, the cardinal angles and the sides being always smooth for a greater or less width, while the front is frequently nearly smooth.

One ventral valve measures as follows: Length, 14 m. m., breadth, 21 m. m., height, about 3 m. m.; another, 14 m. m., 18 m. m., and about 3 m. m.

It is impossible to separate the specimens of *Tropidoleptus* of Ereré, from those forms of *Tropidoleptus carinatus* of New York, which are not carinate along the median line.

Obtained with *S. Pedroana*, etc., from the Devonian sandstone of Ereré, where it is moderately abundant. (Morgan Expedition 1871.)

Vitulina pustulosa, *Hall*, Plate IX, figs. 2, 6–8, 11–13, 15, 20, 21, 27 and 32.

Vitulina pustulosa, Hall, 13th Rep. St. Cab. N. Y., 1860, p. 82.
Vitulina pustulosa, Hall, Pal. N. Y., Vol. IV, p. 410.

The test of the Ereré forms is of moderate size, with the ventral valve very convex, and the dorsal valve flat or very slightly convex; transverse, the breadth varying from one and one-fourth to one and one-half times the length, and greatest at or just anterior to the hinge line, which last is straight. Cardinal extremities usually subangular in young specimens, but becoming rounded in the larger and full grown ones. Lateral and anterior margins forming together a very broad, semi-elliptical curve, which is slightly flattened along the front of the test.

Ventral valve most prominent at or just posterior to the middle, and furnished with a median fold, more or less elevated above the surface of the valve, and formed of two, rounded, prominent plications, each of which is very small where it commences at the beak, and increases rather rapidly in size towards the front. The plications are separated by a rounded or slightly flattened, and generally well defined reverse plication, and each slopes more or less abruptly on the outer side, to a still larger reversed plication, beyond which the sides of the valve slope to the lateral margins with little or no curvature, generally making the valve somewhat broadly subcarinate along the median line. The fold increases very gradually in height from the beak, and the curve along its top is generally quite strong, sometimes becoming

slightly straightened towards the front. Beak small, acute, and but slightly extended beyond the hinge area, of which it is impossible to determine the exact size and shape, since it is invariably concealed by the rock.

Dorsal valve flat, or curving gently from the beak to the front and sides, with a well defined sinus along the median line, corresponding with the fold of the ventral valve, and which, narrow at the beak, increases gradually in width, becoming moderately deep at the front. A rounded, prominent plication occupies the bottom of the sinus, and the margins curve up abruptly to form a large plication on each side.

There are four or five, seldom six, broad, rounded, plications on each side of the fold and sinus, separated by depressions of a similar character. There is a great variation in the size of the plications, which are much larger in some specimens than in others. Those of the ventral valve are, however, always narrower than the intervening depressions; while on the dorsal valve the depressions are the narrower. The plications extend nearly directly from the beak to the margins, arching somewhat strongly along the top near the fold in the ventral valve, but less and less so, becoming smaller, and less distinct towards the cardinal angles, which are sometimes flattened or even slightly reflected, and are smooth in both the valves. There are usually several lines of growth. The entire surface is traversed by very fine radiating raised lines, which rise at regular intervals into minute, hollow spines, with elongated bases, the inner surface of the test showing their position as slight depressions. The minute surface markings are seldom seen on the specimens from the sandstone, which, even when best preserved, show only the bases of the spines, and those very indistinctly. But several moulds of valves, obtained from the underlying yellow shales, have the impressions of the raised lines and the spines well preserved.

The impressions of the hinge teeth are shown in the moulds of the ventral valve, and in the interior moulds of the dorsal valve the impressions of the processes are partially preserved; but on account of the coarseness and friable character of the sandstone in which they occur, we cannot depend upon them as being at all perfect. The cardinal process is somewhat angular behind, and the socket plates are rather broad at the base, but become narrow along the top. The septum is short and low.

A ventral valve of ordinary size measures 11 m. m. in length, 15 m. m. in width and about 3 m. m. in height, but specimens are often found much larger, one being 16 m. m. long, 25 m. m. broad and about 5 m. m. high.

There would be no difficulty in separating the Ereré specimens of *Vitulina* from the small forms of *V. pustulosa*, Hall, described and figured in Vol. IV of the Pal. of New York. But since Prof. Hall wrote the description of this species, he has obtained a great number of specimens from other localities than the first, many of which differ much from those first described, frequently being

larger, with the depression in the median fold and the plication in the median sinus well defined. Thus we have forms which approach so closely those from Ereré, that it is impossible to separate the two. They are undoubtedly identical.

Obtained in great abundance from the Devonian sandstone of Ereré, associated with *Spirifera Pedroana*, etc. A few specimens have also been found in the yellow shale underlying the sandstone. (Morgan Expeditions 1870 and '71.)

Discina lodensis, *Hall.*

Orbicula lodensis, Hall, Geol. Rep. Fourth Dist. N. Y., p. 223.
Orbicula lodensis, Vanuxem, Geol. Rep. Third Dist. N. Y., p. 168.
Discina lodensis, Hall, Pal. N. Y., Vol. IV, p. 22.
Compare *Discina media*, Hall, Pal. N. Y., Vol. IV, p. 20.

Test of the Ereré variety small, subcircular or broadly subovate in outline; breadth about equal to the length, and greatest at, or slightly anterior to, the middle; generally narrowing more or less posteriorly, and often slightly truncate behind.

Both valves are always so flattened in the shale, that their true convexity is undeterminable. The nuclei, which were probably acute, at least in the dorsal valve, are also flattened down to the surface of the valves and broadened. Their distance from the posterior margin varies with the age of the test, it being, in the dorsal valve, from about one-third the length of the valve in the very young, to about one-fifth the length in full grown specimens; but in the ventral valve, their distance from the posterior margin is always somewhat greater than in the dorsal valve, averaging about one-third the length of the valve, thus giving more space for the foramen, which is narrow, linear, and extending from very near the nucleus to within a varying distance from the posterior margin. The concentric lines of growth are numerous, rather fine, yet prominent, and more closely crowded together posterior to the nuclei.

The larger specimens measure in length and breadth about 8 m. m., and there are all sizes from this down to individuals of very small size.

This *Discina* from Ereré, is undoubtedly only a variety of *Discina lodensis*, Hall, Genesee shale, New York. The Brazilian variety, together with *D. lodensis* and *D. media*, Hall, of the Hamilton and Chemung groups, probably forms a single species, which extends through all the latter portion of the Devonian age of North America, and has also a wide geographical range; the specimens varying somewhat, according to the conditions under which they lived, and the rock in which they are preserved.

Obtained in great abundance from the dark shales of the Devonian of Ereré, in various stages of growth, with *Lingula Monte-Alegrensis*, etc. (Morgan Expeditions 1870 and '71.)

Though only six specimens of *Lingula* were obtained at Ereré, these appear to represent, at least, four determinable species, one of which may prove to be identical with *Lingula spatulata* of the Genesee shale, New York, while the others seem to be new to science.

Lingula spatulata? Fig. 1.

Lingula spatulata, Hall and Van., Geol. Reps., 3d and 4th Districts New York, 1842 and '43.

Lingula spatulata, Hall, Pal. N. Y., Vol. IV, p. 13.

The only specimen of this species found at Ereré, consists of a single valve, which is small and half as wide as long. The strongly rounded front, and sub-parallel, nearly straight, lateral margins, forming a somewhat elliptical outline. The posterior third of the valve is angular, the margins being inclined towards one another at an angle of about 70 degrees. Being defective at the apex, it is impossible to determine the original form of the beak, though it was probably acuminate and strongly elevated. The valve is very convex, flattened toward the front, from which it rises gradually nearly to the beak, toward which it slightly declines. In the front and middle the valve curves regularly from side to side, but, toward the beak, it becomes very slightly subangular along the median line.

L. Spatulata, Hall.

Faint traces of the substance of the test appear to be preserved, and the lines of growth are indistinctly visible. Length 9 m. m., width 4.5 m. m.

Although this specimen of *Lingula* is much larger than the specimens of *Lingula spatulata* from New York, yet the outline is so nearly the same, that it does not seem possible to separate the Ereré form from the New York forms, more especially since a variety of *Lingula spatulata* has been obtained from the West, which is much larger than the one from New York.

This is the only species of *Lingula* yet detected in the Devonian sandstone at Ereré, where it was found associated with *Spirifera Pedroana*, etc. It is readily distinguished from the species of the underlying dark Discina shale by being more angular posteriorly. (Morgan Expedition 1871.)

Lingula Graçana, *Rathbun*, sp. nov., fig. 2.

*L. Graçana.**

In the only specimen of this species yet obtained, the test is small and elongate, the greatest width, which is just behind the middle, being equal to about one-half the length. The outline is elliptical, the lateral margins being very slightly straightened and inclined towards the front; beak indistinct; surface, where preserved, marked with numerous, exceedingly minute, closely arranged, concentric lines, together with a few, coarse growth-lines, imperfectly preserved in the specimen. The valve is very flat, but this may be the result of pressure. Length 6.5 m. m., width 3.5 m. m.

This species, which somewhat resembles in form certain varieties of *L. mytiloides, Sow.*, of the Carboniferous of England, occurs with *Discina lodensis* in the dark shale of the Devonian, near the Igarapé de Ereré, Province of Pará, Brazil. (Morgan Expedition 1870.)

Named in honor of His Excellency, Dr. Abel Graça, President of the Province of Ereré in 1870 and '71, to whom Prof. Hartt is indebted for the use of the steamer Jurupensem on his Expedition of 1870.

Lingula Stauntoniana, *Rathbun*, sp. nov., fig. 3.

L. Stauntoniana.

This species is represented by a very perfect, though probably flattened impression of a single valve; but, notwithstanding that it preserves faint indications of muscular markings, I have not been able to determine whether the valve is ventral or dorsal. The valve is small, a little longer than broad, the greatest width being at about one-fourth the length from the front. In its posterior three quarters it narrows backward, the margin being regularly elliptical in outline, and consequently bluntly rounded behind, without a distinct beak. In the anterior fourth of the valve the margin, nearly straight in front, curves rather abruptly round on each side to meet the lateral margins, so that the general outline of the valve is an oval, slightly flattened in front. The V-shaped line, shown in fig. 3, appears to represent the anterior limits of the muscular impressions. Length 8.5 m. m., breadth 6.5 m. m.

This species occurs associated with *Discina lodensis* in the dark shale near the Igarapé de Ereré, Province do Pará, Brazil. (Morgan Expedition 1871.)

Dedicated to Mr. Phineas Staunton, a member of the Expedition of 1870.

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*I have given only an outline drawing of this species of *Lingula*, since it is impossible to represent accurately its surface markings in a wood cut.

Lingula Rodriguezii, *Rathbun,* sp. nov.

Dorsal valve rather large, elongate, and oblong in outline. Front very slightly rounded, but curving somewhat strongly to meet the lateral margins, which, curving but slightly, extend backwards nearly parallel with one another for about three-fourths the length of the valve. The posterior lateral margins incline towards one another at an angle of about 100 degrees, and the beak is apparently a little rounded. The outline of the valve is very defective, but I have been able, I think, to trace it out very satisfactorily from the rather numerous lines of growth, which are quite well preserved on the front; but the valve is so crushed that it is impossible to determine its convexity.

The impressions of the several muscular markings are more or less perfectly preserved. They show that the valve is dorsal. The impression of the pedicle muscle is not preserved, but just in front of the place where it should be, are two small crescent-shaped impressions, placed closely together and apparently more deeply excavated in the substance of the test than are the other muscular markings. The markings left by the decussating muscles seem to be narrow and elongate, but the outline is indistinct. They are apparently situated at the sides of a raised, circular disc, from the front of which extends a short, low and rather broad median crest, but the test is so broken that the appearance of a disc and crest may not be natural. On each side of this crest are the impressions of the posterior adductors, which seem to be unusually small, while the subelliptical impression of the anterior adductors in front of the crest is also very small. One or two narrow, faint, curving depressions extend forward from the front of the impressions of the decussating muscles, and probably denote structure. There is a V-shaped line on the forward portion of the disc, apparently of the same character. Length 22 m. m., breadth 13 m. m.

Obtained from the yellow shale underlying the sandstone at Ereré.

Dedicated to Dr. J. C. Rodrigues, Editor of the Novo Mundo, New York, one of the most prominent patrons of the Morgan Expeditions of 1870 and '71.

Although the fossils so far obtained from Ereré, were collected from so small an area and so limited a thickness of rock as to render it unsafe to draw any extended or definite conclusions from them; yet the Brachiopod fauna, such as it is, resembles so closely that of the Hamilton group of New York State, as to leave no doubt that the beds in which it was found, the sandstones and shales of Ereré, represent about the same horizon as the Hamilton group of North America. Not only are characteristic Hamilton group

genera found in the Ereré beds, but even species of those same genera, which cannot be separated from North American species of the Hamilton group.

Spirifera Pedroana, so abundant at Ereré, seems to represent, not a single species of the Devonian, but several, which form a series extending through the Corniferous and Hamilton groups. The different species of this series are very distinct from one another in their extreme forms, but they are so connected by intermediate varieties, that they present a good subject for the study of development. The series includes in North America *S. varicosa* and *S. macra* of the Corniferous, and *S. medialis*, *S. macronota* and *S. angusta* of the Hamilton. *Streptorhynchus Agassizii*, the most abundant fossil at Ereré, belongs to that transition group of the *Streptorhynchi* which helps to characterize the Devonian; yet, so far as at present known, the new species does not attain the large size of the Devonian species of that genus elsewhere. The genus *Vitulina* has been known by only a single species, which is confined to the Hamilton group of New York, and was considered rare, but somewhat recently it has been found in greater abundance. The Ereré form does not differ from the larger varieties of *V. pustulosa*, Hall, of the Hamilton group. The Ereré *Tropidoleptus* is identical with the uncarinate forms of *T. carinatus* from the Hamilton group of New York. Though only a very few specimens of *Rhynchonella* have been obtained from Ereré, there is little difficulty in uniting them with *R. dotis* of the Hamilton. The genus *Chonetes* is represented by several species, all of which are closely related to Hamilton group species of New York. The single species of *Discina*, and one of the species of *Lingula*, are probably only varieties of North American Hamilton group species. It may appear strange that many of the most common genera found in the Devonian, such as *Atrypa*, *Strophodonta*, *Productella*, etc., are wanting, while more obscure genera are abundantly represented; but when we consider that the collections were made over an area of only a few feet in extent, and from a thickness of but a few inches, we must see that it is just what might be expected.

XXIV. New Phalaenoid Moths

BY LEON F. HARVEY, A. M., M. D.

[*Read before this Society, January* 2, 1874.]

THE collection of this Society contains specimens of the following Moths, which, among others, have been handed to me for study and identification by Mr. Grote. One genus and three species, described in the present paper, belong to the Bombyces (*Phalaenae* Hübn., *Bombycidae* Auct.), and three species to the Geometrae (*Geometridae* Auct.).

BOMBYCES.

Heteropacha, n. g.

This generic term is proposed for a form allied to Gasteropacha and our American genera Tolype and Artace, while in its colors it recalls the dusky olivaceous species of Heterocampa. The eyes are hairy; the ocelli probably wanting; the antennae (♂) short, with double, lengthy, converging pectinations which shorten over apical two-thirds; the body parts are shaggily haired. The fore wings are narrow, widening externally, thinly scaled, entire; hind wings ovate, with costal shoulder; primaries 10-veined, cell open; 2 from the median vein near the base, 3 half way between 2 and 4 and thrown off at about the center of the wing, 5 the termination of the nervure; subcostal nervure a little bent; 6 and 7 on to external margin, a short furcation; 8 a little below apex, 9 to costa; hind wings 9-veined, cell opened; 9 a short bent veinlet on the costal shoulder, 6, 7 and 8 arising near together at basal third, 6 thrown off below—a long vein to apex, 7 to costal margin within the apex, 8 a short vein to costa at about the middle of the wing. The abdomen is as long as the hind wings and the thoracic disc is destitute of the metallic scales of Tolype.

Heteropacha Rileyana, *Harvey,* Plate 11, fig. 1.

♂.—Dark grayish fuscous; primaries with two irregular, light gray, continuous bands, the first at base, short, the second, fainter, at apical third, followed by a series of subterminal dots on the veins; external margin with indistinct gray dots; veins marked; the denuded integument shows an irides-

cence similar to Tolype; hind wings concolorous, with a gray band at the middle of the wing on costal region; body darker than wings; antennae with the stem gray above.

Expanse, 30 m. m. *Habitat*, Missouri (C. V. Riley).

It gives me great pleasure to name this species after Mr. C. V. Riley, State Entomologist, St. Louis, Mo.

Heterocampa subrotata, *Harvey*, Plate 11, fig. 2 ♂, 4 ♀.

♀.—Antennae simple; palpi porrect; thorax of a greenish brown or gray; abdomen large, exceeding the hind wings, having a dorsal tuft at its base, in color a pale fuscous; primaries bright olivaceous; median lines bright brown; basal line black, distinct, running on to posterior border; space between basal and inner median line strongly tinged with green; both median lines double, lunulated, black, including a light brown shade; a semi-lunar black streak at the disc, its convexity towards the thorax, the space between it and the geminate outer median line is pale. In its general course the outer median line is twice equally exserted, first on s. c. nervules and again on median nervules, running inwardly below the median vein, when it approaches more nearly the inner line. Subterminally the wing is whitish, relieving the irregular, disconnected subterminal line, which appears as black, interspaceal points or streaks. The terminal line is fine, a little waved, the terminal space being again greenish or bright olivaceous as are the fringes, which are faintly cut with black at extremity of the veins. Beneath fuscous, with four or five black dots on the costa near the apex; at base very hairy; broad, diffuse, darker shadings in the center of wing, and a diffuse, continued darker, subterminal shade, limited outwardly by the paler, whitish terminal space; black markings on the fringes at the termination of the veins. Secondaries cinereous, paler at base, approaching to olivaceous, fringes nearly white, with black dots; below concolorous, though of a lighter shade; a black dash at the basal angle. The ♂ differs from the ♀ by the sub-terminal line being more undulatory, by the less prominently contrasting brown and whitish shades beyond the cell subterminally, while the antennae are pectinate.

Expanse, 33 to 34 m. m.

Four specimens collected by Mr. Grote in central Alabama. Smaller than *H. obliqua* and *H. astarte*, to which it is allied.

Heterocampa celtiphaga, *Harvey*, Plate 11, fig. 3 ♂.

♂.—Smaller than H. subrotata; antennae pectinate; palpi dependant, thickly hirsute; thorax dark ashen; abdomen paler, becoming dark ashen towards the tip; primaries dark olivaceous ashen, almost approaching to black. All the lines light brown and narrow and similar to H. subrotata, in their conforma-

tion; apical white shade not as extended. Fringes ashen; discal lunate mark brown; from this the scalloped transverse posterior line is externally further removed than in H. subrotata. Secondaries white, with an incomplete whitish median shade; terminal line black, even; fringes ashen, pale at base, cut with darker hairs at extremity of the veins.

Expanse, 18 m. m. Larva on Hackberry (*Celtis occidentalis*).

The specimen was received from Mr. C. V. Riley. It is the smallest species of Heterocampa yet known to science.

GEOMETRAE.

Larentia Oeneiformis, *Harvey*, Plate 11, fig. 5.

♀.—Wings entire; upper surface ashen or cinereous with a smoky tinge; costal region and terminal portions of the fore wings darker; primaries with three white and broad bands, marked on costa but discontinuous; the third (outer median) more continuous, angulated at vein 5 and indistinctly discernible towards the internal margin; the first and second bands are approximate, discontinued; the costal region above the subcostal nervure is here reticulated; fringes white, distinctly cut with dark at the extremity of the nervules up to and within the depressed and rounded apices. Terminally the nervules are darker marked; hind wings smoky ashen, with white fringes as on fore wings; below the primaries are largely smoky ashen, but along the costal region the three white bands of the upper surface again appear, the costal region is tinged with olivaceous and beautifully striated with black, leaving the apices whitish with costal black dots; the hind wings are entirely covered with irregular and fine black striations on a white ground; a median white band can be made out, followed below costa, and again on internal margin, by more distinct striae on an olivaceous ground; fringes on both wings tinged with reddish; thorax ashen with two white vittae; front dark; the secondaries have the cell closed, outwardly prolonged inferiorly; vein 5 equally strong.

Expanse, 33 m. m. *Habitat*, Montreal, Mr. F. Caulfield.

Resembles superficially the species of the genus Oeneis (*Chionobas*), in the ornamentation of the wings.

Scotosia dubitata, *L.*, Plate 11, fig. 7 ♀.

♂ ♀.—This is a large bright brown species with dentate wings; the fore wings are covered by numerous wavy black lines, followed by pale shades, while the subterminal line appears wholly pale. The four usual transverse lines are distinguishable, darker than the rest. The base of the wing and me-

dian space are freest from pale shade lines, more purely brown; the sub-basal space is wide, the basal line distinctly followed by pale scales; the median lines are tolerably approximate, nearly equidistant, geminate, inner line the strongest, and they are shaded with black and accentuated about the median nervure; all the veins dotted and streaked, pale and blackish; the festooning of pale scales, forming the subterminal line, is accentuated on the subterminal fold; these pale scales in a certain light have a greenish cast; terminal line black, subcontinuous, appearing on the secondaries; hind wings pale fuscous brown, with the continuation of the wavy, and here much fainter, transverse lines obsolete; the more prominent are marked in black, and the veins dotted on costal region of primaries; collar with blackish scales; body parts brown; antennae simple.

Expanse, 38 to 45 m.m. *Habitat*, Montreal (Mr. Frank Caulfield).

This species varies slightly in the paler powderings of the wings. On examination and comparison I cannot separate our specimens satisfactorily from the European material in the collection of this Society, and conclude that the form is identical on both continents. The species is discussed by Dr. Packard, Proc. Bost. Soc. Nat. Hist., Vol. XI, p. 44.

Bapta viatica, *Harvey,* Plate 11, fig. 6.

♂ ♀.—Smaller and darker than the European *Temerata,* with darker fore wings; faintly bluish white and gray; fore wings bluish gray with the blackish brown, inner median shaded line interrupted; a black discal point; outer median blackish brown line diffuse, continuous, accented on the veins, curved; terminal portion of the wing stained more or less with blackish, coloring the fringes except at internal angle; subterminal line diffuse, continuous; hind wings bluish white with discal dot, traces of a median line and distinct, black, marginal points; fringes white; beneath both wings bluish white with distinct black discal dots, longer on the fore wings; these latter show the outer median and subterminal lines, which are neatly dentate; terminal margin whitish; fringes black; hind wings with white fringes, dotted median line and terminal points, and a faint trace of a subterminal line; body parts bluish gray; hind wings with veins 3 and 4 from one point.

Expanse, 20 m.m. *Habitat*, "Catskill Mountains, on roads, flying in the day time." Theo. L. Mead; Quebec, F. X. Bélanger.

XXV. Notes on the Species of Pasimachus

BY JOHN L. LE CONTE, M. D.

[*Read before this Society, January* 16, 1874.]

Among the crude results of my earlier studies in Entomology was a monograph of the species of Pasimachus, inhabiting the United States, published, with outline figures, in the 4th volume of the Annals of the Lyceum of Natural History in New York, pp. 141–151, plates 7 and 8.

Being then inexperienced in the recognition of species, I was, like most young naturalists, led to exaggerate the value of characters which were either individual or unimportant, and thus to multiply the supposed distinct forms beyond what larger series of specimens have shown to be tenable. I have endeavored to make the corrections required by more careful study as soon as circumstances permitted, but the remarks have become scattered in various papers, so as not to be very accessible. By the kindness of Mr. P. S. Sprague, of Boston, I have recently received a new species, very remarkable by its size, and wishing to make known so important an addition to our fauna, I avail myself of the opportunity to append to its description notes and synonyms of the other species.

A very interesting series of comparative notes on the species known to him is contained in the Premices Entomologiques of my learned friend Mr. Putzeys, cited in the following pages. With the exception of those derived from the antennae and the labrum, they appear to me of somewhat difficult verification, and I therefore, in the presence of stronger characters, have not used those derived from the mentum and lingula. The form of the labrum is subject to some variation, according as the specimen is young, or old and worn; in the latter case, the middle lobe becomes less prominent, and wider, though rarely to such an extent as to prove deceptive; the same may be observed regarding the teeth of the front tibiae.

The species are widely distributed over the Atlantic slope, extending as far west as Utah (*P. californicus*) and Arizona (*P. costifer* and *mexicanus*); none has occurred in California, and the species which bears the name of that region was certainly given to Baron Chaudoir with an erroneous locality.

The species may be divided into three groups, characterized as follows:

I. Elytra obtusely rounded behind; spine of middle tibiae compressed, obtuse at top.

Elytra subacute behind; spine of middle tibiae slender, acute;

II. Prothorax not constricted at base.

III. Prothorax more or less constricted, hind angles prominent, body more slender.

I. SUBLAEVIS Group.

In this group the labrum is distinctly trilobed, the lateral lobes wider than the middle one, and sinuate; the mandibles are obliquely rugose; the mentum tooth rounded at tip, and scarcely concave. The 2–4 joints of the antennae are not compressed. The prothorax is strongly but narrowly margined, broadly rounded on the sides, somewhat narrowed at base, but not constricted. The elytra are parallel on the sides, convex, obtusely rounded behind, and more or less sulcate; the humeral carina fades gradually into a faint interspace between two of the furrows; the general form is more robust than in the other groups.

1. P. strenuus, n. sp.

Very large, prothorax rather suddenly narrowed at the base, hind angles rectangular prominent; elytra feebly sulcate.

Length, 35 m. m.; 1.4 inch.

Two specimens, Florida. For a very fine specimen of this, the largest species of the genus, I am indebted to Mr. P. S. Sprague, and for another to Mr. Edward Tatnall, Jr. It is closely related to the next, and with a large series of specimens will probably be found to vary in a similar manner. It is easily known by the rectangular hind angles of the prothorax.

2. P. sublaevis.

Prothorax suddenly narrowed near the base; hind angles obtuse, not prominent; elytra feebly sulcate, sometimes nearly smooth.

Dej. Sp. Gen., 1, 408. Bonelli, Obs. 2d, 46; Lec. Ann. Lyc. New York, IV., 149, pl. VIII., f. 2; Putzeys, Premices Entom., 9.

var. *P. rugosus*, Lec. Ann. Lyc., IV., 149, pl. VIII., f. 1.

var. *P. assimilis*, Lec. ibid., 148, pl. VII., f. 8.

var. *P. substriatus*, Hald. Proc. Acad. Nat. Sc., Phil., I., 313; Lec. l. c., 147, pl. VII., f. 6.

Length, 21–28 m. m.: .83–1.1 inch; New York to Florida, and westward to Illinois.

This species varies in size and sculpture, and there is every intermediate grade between the type, with well defined, though shallow grooves, to the smooth and more shining *substriatus*. These intermediate forms were described by me as *rugosus* and *assimilis*, the former being an individual variation, having the basal impressions of the prothorax rugous.

II. MARGINATUS Group.

In this group the labrum is rather feebly lobed, the middle portion broader than in the preceding; the mandibles are obliquely rugose, but much more feebly than in the 1st group; the mentum tooth is rounded at tip, and somewhat concave. The joints 2–4 of the antennae are not compressed. The prothorax is broadly rounded on the sides, feebly narrowed behind, with the angles obtuse and not prominent in *marginatus*, rectangular in *subsulcatus;* the side margin is widely depressed in *marginatus*, and narrower in *subsulcatus*. The elytra are less convex, feebly sulcate, with the alternate intervals more elevated, the sides are slightly rounded, and they are obliquely narrowed behind, and not broadly rounded as in Group 1; the humeral carina fades gradually into an interspace. The spine of the middle tibial is slender and acute, and the hind tarsi longer and more slender.

3. **P. marginatus,** *Bonelli,* Obs. Ent., 2d, 45; St. Farg. et Serv. Enc. Méth., X. 16, pl. CLXXXI., f. 8; Dej. Sp. Gen., I., 407; Laporte Hist. Ins. I., 63; Lec. Ann. Lyc., N. Y., IV., 151, pl. VIII., f. 4; Putzeys, Prem. Ent., 8.
Scarites marginatus, Fabr. Ent. Syst., I., 94; Syst. El., I., 123; Oliv. No. 36, 5, pl. II., f. 20; Beauvois, 106, pl. XV., f. 1, 2; Latr. Hist. Crust. and Ins., VIII., 376.

South Carolina; southward, not uncommon.

4. **P. subsulcatus,** *Say,* Trans. Am. Phil. Soc., II., 19; Ed. Lec., II., 449; Dej. Sp. Gen., II., 471; Dej. and Boisd. Icon. Col. Eur., I., 207, pl. XXII., f. 2; Lec. Ann. Lyc., N. Y., IV., 150, pl. VIII., f. 3.

Georgia and Florida, rare. Of the same form as *P. marginatus*, but much smaller, with the sides of the prothorax less widely margined, and the hind angles rectangular and slightly prominent.

III. DEPRESSUS Group.

In this group, though in some of the species the relative proportions of the body have not changed, the general form is more slender, from the prothorax being more gradually and more strongly narrowed behind; the hind angles are always rectangular and prominent. The labrum varies in form, being broadly and feebly trilobed (*depressus*), or distinctly so, with the middle lobe narrower (*californicus,* etc.); the mandibles are feebly rugose, or nearly smooth; the mentum tooth is usually deeply concave, and appears almost emarginate. The 2–4 joints of the antennae are sometimes feebly compressed (*mexicanus*), but in the others strongly so, and subcarinate. The elytra are broadly rounded on the sides, obliquely narrowed behind; they are usually smooth, but in two species (*obsoletus* and *duplicatus*) are more or less sulcate towards the sides; in this case the humeral carina is continued into a ridge, otherwise it is abruptly terminated and differs in length in the different species. The spine of the middle tibiae is slender and acute, the hind tarsi are longer and more slender in *depressus* than in the others. The species may be thus tabulated:

A. Antennae with joints 2–4 not carinate; elytra with fine rows of punctures arranged in pairs; margin green,.....*mexicanus.*

B. Antennae with joints 2–4 compressed and carinate:

A. Hind tibiae ♂ not densely pubescent on inner side:

a. Labrum broadly and feebly trilobed; elytra not sulcate, humeral carina moderate, hind tarsi long and slender,..... ...*depressus.*

b. Labrum distinctly trilobed; elytra sulcate towards the sides, elytra more narrowly margined:

Less slender, elytral rows of punctures double or obsolete,.....*duplicatus.*

More slender, elytra rows single,.....*obsoletus.*

B. Hind tibiae ♂ densely pubescent on the inner side near the tip:

Elongate, humeral carina long,.....*elongatus.*

Broader, humeral carina shorter:

Humeral carina moderate,.....*punctulatus.*

Humeral carina very short,..... ....*californicus.*

5. P. mexicanus, *Gray,* Griffith's An. Kingd., 274, pl. XII., f. 1; Laporte, Hist. Ins., I., 63.

P. viridans, Lec. Proc. Ac. Nat. Sc., Phila., 1858, 61.

One specimen, collected by Mr. Schott, while attached to the United States and Mexican Boundary Commission, probably in Arizona. The form is rather slender, the elytra less convex than in *elongatus*, with distinct rows of punctures arranged in pairs; the humeral carina is very short; the lower joints of the antennae are not at all compressed or carinate; the labrum is broadly trilobed, the middle lobe wider than the side lobes, though distinctly separated from them; the mandibles are rather deeply rugose; the side margin of the prothorax is narrower than in the other species of the group, and with the base and the sides of the elytra, is tinged with metallic green.

6. P. depressus, *Bonelli,* Obs. Ent. 2d, 45; Say, Trans. Am. Phil. Soc., II., 19; Ed. Lec. II., 145; St. Farg. et Serv., Enc. Méth., X., 15; Dej. Sp. Gen., I., 406; Aud. and Brullé, ... 61; Laporte, Hist. Ins., I., 63; Lec. Ann. Lyc., IV., 145, pl. VII., f. 1; Putzys, Prem. Ent., 6.

Scarites depressus, Fabr., Ent. Syst., I., 94; Syst. El., I., 123; Oliv., No. 36, 5, pl. II., f. 15; Herbst, Käfer, X., 254, pl. CLXXV., f. 4; Latr., Hist. Crust., et Ins., VII., 376; Beauvois, Ins. Afr. and Amér., 106, pl. XV., f. 3.

Scarites complanatus, Gmelin, Linn. IV., 1993.

var. *P. morio,* Lec. Ann. Lyc., IV., 145, pl. VII., f. 2.

var. *P. laevis,* Lec., ibid.. 146, pl. VII., f. 4.

Eastern region from New York to Louisiana and Illinois. The labrum is very broadly and feebly trilobed, the middle lobe wider than the side ones. The hind tibia and tarsi are longer and more slender than in the following species; the joints of the antennae 2–4 are strongly compressed and carinate; the mandibles are feebly (var. *laeris*), or not at all striate; the tooth of the mentum is deeply concave, and seems almost emarginate.

The specimens from the Southern States are frequently without the blue margin, and are of a more dull color than those from the north. Dr. Zimmermann believed that they indicated a distinct species, to which he gave the name *morio*, adopted in my synopsis above cited; the description of Fabricius does not mention a blue margin, and it is possible, therefore, that his type should be referred rather to the race *morio*, than to the usual form which is described by Say and Dejean.* The female is dull, the male shining.

7. **P. duplicatus,** *Lec.*, Trans. Am. Phil. Soc., X., 395.

var. *P. costifer,* Lec. Proc. Ac. Nat. Sc. Phila., 1854, 79; Journ. Ac. Phila., 2d, IV., 15, pl. IV., f. 11.

Texas, northward to Indian Territory. This and the next species are nearly related, and differ by the arrangement of the striae of the elytra, which in this are represented by rows of punctures approximated by pairs, but in *obsoletus* by equally distant rows; in the best marked specimens the alternate interspaces towards the sides are elevated, forming ridges, with broad intervening grooves; sometimes these ridges and grooves disappear, and even the rows of punctures cannot be seen, and only the outermost of the ridges remain; this is the variety which I named *costifer*. The labrum is distinctly trilobed, the middle lobe advanced, and rounded, not wider than the side lobes, which are subacute and sinuate externally; the mandibles are very feebly striate; antennae as in the preceding; hind tibiae and tarsi alike in both sexes.

In one specimen from Arizona even the sub-marginal costa has become obsolete, marked only by a very feeble marginal furrow.

* Dr. Zimmermann recognized this fact after the publication of my synopsis, but still viewing the two forms as distinct species, called the one with a blue margin *P. limbatus*, with the following remarks, which I translate from his MS.: "Of precisely the same form as *depressus*, also with smooth mandibles, and slender hind tarsi, which are longer than the tibiae; but usually somewhat smaller, proportionally narrower, more convex, and with the humeral carina a little shorter; shining black, with the sides of the prothorax and elytra blue or violet.

8. P. obsoletus, *Lec.*, Ann. Lyc., New York, IV., 148, pl. VII., f. 7.

Kansas and Colorado. Besides the difference in the elytral striae, above mentioned, this species has the prothorax more narrowed behind, with the hind angles more prominent, and the elytra less rounded at the humeri. I may further observe that the elytra in this and the preceding are less widely margined than in *P. depressus*, and the following species. This affords a good character for distinguishing the smooth varieties of these two species from all the others.

9. P. elongatus, *Lec.*, Ann. Lyc. New York, IV., 147, pl. VII., f. 5.

P. depressus, var. a ‡, Say, Trans. Am. Phil. Soc., II., 19; Ed. Lec., II., 449.

Illinois, Missouri, Kansas and Colorado. Easily known by the more elongate form, and longer humeral carina; the labrum is broadly trilobed, the middle lobe wider than the side lobes; the mandibles are more finely striate than usual; the elytra are as widely margined as in *P. depressus*, but are more convex, and the humeral carina is longer, and curves outward in front; traces of very fine rows of punctures approximate by pairs may sometimes be seen; the hind tibia and tarsi are less slender than in *P. depressus*, and the former in the ♂ are densely pubescent on the inner side, near the tip.

Old specimens are found in this, as in other species in which the labrum is worn almost straight in front. The side margins of the prothorax and elytra are usually bright blue.

10. P. punctulatus, *Hald.*, Proc. Acad. Nat. Sc., Phila., I., 299.

Alabama, Texas, and Western States to Illinois. Of the same form as *P. depressus*, but differing by the hind tibiae and tarsi less slender and less elongated; the former in the ♂ are densely pubescent near the tip on the inner face. The labrum is feebly and broadly lobed, with the middle lobe wider, scarcely separated from the side lobes. The elytra are as widely margined as in *P. depressus*, and the humeral carina is about as long; in most specimens rows of punctures slightly approximate by pairs may be seen, but in

some individuals they are not visible. The mandibles are rather coarsely striate, sometimes nearly smooth. The side margins of prothorax and elytra usually are blue.

11. P. californicus, *Chaud.*, Bull. Mosc., 1359, II., 437.

P. punctulatus ‡, Lec. (nec. Hald.) Ann. Lyc., New York, IV. pl. VII., f. 3.

P. validus, Lec. Jour. Acad. Nat. Sc., Phil., 2d. IV., 14, pl. IV., f. 10.

P. corpulentus, Lec. ibid. 15.

Texas, northwards to Colorado and Utah. Easily known by the very short humeral carina; the size is usually greater than in the other species of this group. The labrum is trilobed, the middle lobe, when not worn, prominent, a little wider than the side lobes; the mandibles are deeply striate; the joints 2–4 of the antennae are more strongly compressed and carinate than in the other species; the hind tibiae and tarsi are less elongated and less slender than in *P. depressus,* and the former in ♂ are very densely pubescent on the inner face, near the tip. When rows of punctures are visible on the elytra they are approximated by pairs; the side margin is feebly tinged with bluish, and is narrower than in *depressus,* though wider than in *duplicatus* and *costifer.*

P. corpulentus is probably a form of this species; the elytra are proportionally broader and more rounded on the sides, the mandibles nearly smooth, and the middle lobe of the labrum less prominent.

XXVI. Description of two new Noctuidae from the Atlantic District

BY H. K. MORRISON, CAMBRIDGE, MASS.

[*Read before this Society, February* 13, 1874.]

Valeria Grotei, nov. sp.

Eyes naked, dark green, with numerous black spots. Antennae strongly ciliated. Palpi slight, with the first two joints light brown, the third black, tipped with whitish. Front, vertex and collar clothed with dense, fine, dark brown hair. A transverse black line on the prothorax. Thorax stout, clothed with long, thick, mingled black, brown and whitish tipped hairs. A dorsal patch of white hair just behind the prothoracic black line. Abdomen yellowish gray, with a black band between each of the segments and with a conspicuous black tuft on the seventh segment. Beneath, breast and legs clothed with long blackish hairs, abdomen lighter. Anterior wings, above, dark olivaceous brown, squamation coarse and rough. Ordinary lines fine, black, hardly perceptible on account of the depth of the ground color; exterior line geminate, its outer line less distinct, strongly projected inwardly, below the cell irregularly dentate. Interior line geminate, interrupted. Median shade blackish, diffused. All the nervules are irregularly marked with blackish, particularly the median branches. A black elongate spot on the fourth median nervule near its termination. Subterminal line white, its superior portion undulating, or zigzag inferiorly, forming a broad inward curve enclosing the black spot on the fourth median nervule. Orbicular small in proportion to the reniform, whitish, clearly defined, with an internal black annulus. Reniform very large, white, diffused, crossed interiorly by a brown shade line, the rudiment of an annulus. A series of four or five white costal spots above the reniform. A sub-triangular glaucous blotch with its base resting on the inner margin a little before the inner angle. A series of black dots at the base of the fringe, followed by a marginal whitish outwardly scolloped line. Posterior wings white, slightly yellowish. Median line formed of black dots on the nervules; outer margin of the wing more or less clouded with black atoms. There are traces of a subterminal pale line and a fine terminal black line formed of united lunules; from the median line outward the nervules are strongly marked with black; the discal dot beneath shows faintly above. Anterior wings, beneath, powdered with fine black atoms. A pale glaucous border, broad and suffused along the inner margin, narrower and clearly defined along the outer margin. Costal margin tinged with ochreous. Disc gray, with gray hairs following the course of the median nervure and at the base of the wing. Reniform spot reproduced beneath, whitish, with a

black linear center; rudiments of the exterior line in spots near the costa. Median branches marked in black. Posterior wings, beneath, white, tinged with ochreous. Costa and costal angle more conspicuously ochreous. Discal dot round, black, distinct. Median line subobsolete, punctiform; black atoms border the costa and outer margin, accumulated at the costal angle.

Expanse, 40 m. m. *Length of body*, 16 m. m. *Habitat*, Massachusetts. Specimens taken in Cambridge from April 10th to 26th. Coll. H. K. Morrison.

This is the first species of Valeria which has been discovered in North America; it belongs to the same section of the genus as the European *V. oleagina* (*W. V.*), than which its wings are more elongate, and antennae slightly less pectinated. Our species has a marked bombyciform appearance, caused by the pectinated antennae, the short, robust thorax and abdomen, the former thickly clothed, and by the peculiar squamation. It has also a superficial resemblance to the common *Hadena adjuncta* (*Boisd.*), caused by the conspicuous white reniform and orbicular.

I have dedicated this interesting species to my kind friend Mr. A. R. Grote, to whom I am much indebted for aid in my entomological work.

Ablepharon famosum, nov. sp.

Palpi outwardly and legs inwardly concolorous with the breast, which is blackish drab, tibiae and tarsi outwardly and the front lighter drab. Thorax and anterior wings above dark shining brownish drab, the color slightly increasing in depth from the base outwards. From the base beneath the median nervure there is a light linear shade extending one-third the length of the cell. All the nervules are marked with lighter drab, particularly towards their termination. The proximity of the costal branches gives the costal margin an evident lighter appearance. Posterior wings, above, uniform dark shining drab; wings beneath dark drab, nervules of both wings lighter, but not so conspicuously so as on the anteriors above. Anteriors with the costal margin, and a central shade proceeding from the base, of a brownish drab. A diffused blackish spot at the termination of the cell.

Expanse, 36 m. m. *Length of body*, 14 m. m. *Habitat*, Massachusetts. May 24th and 26th. Coll. H. K. Morrison. Closely allied to *A. Henrici*, with which it agrees in form and structure.

This species may, by the discovery of intermediate specimens, be considered an abnormal variety of *Henrici*, but at present and until further material is obtained, I am disposed to think it distinct, in which opinion Mr. Grote concurs.

XXVII. Rectification of Treitschke's use of Hübner's generic term "Cymatophora"

BY LEON F. HARVEY, A. M., M. D.

[*Read before this Society, February* 13, 1874.]

"CYMATOPHORA," a generic term, first appears in Hübner's Tentamen.* The date of that paper cannot be now, perhaps, accurately ascertained, but we can sufficiently approximate it, for our present purpose. In his "Verzeichniss" (1816), Hübner makes mention of the Tentamen in the preface, saying that he had intended publishing a catalogue, and had issued the Tentamen as a preliminary step. We also find an allusion to it in the fourth volume of Ochsenheimer's work (afterwards continued by Treitschke), published in 1816, in the following words: "Dieses Blatt kam mir erst lange nach dem Abdrucke des dritten Bandes zu Gesichte, daher konnte ich früher nichts davon aufnehmen." Therefore it must have been issued between the years 1808 and 1816.

Whilst studying the Geometridae, my attention was called to Hübner's use of the term Cymatophora in his Samm. Exot. Sch. He gives in his Tentamen, under the Geometridae, the European Roboraria as the type of his genus Cymatophora, which shows that Treitschke had no authority for his later use of that generic term in the Noctuidae. If now, in 1874, we read the Verzeichniss, we must be struck with the fact that we are realizing Hübner's conceptions in 1816, to a much greater extent than before. And we must feel that his general ideas of classification, with so scant material upon which to base his conclusions, with but few predecessors to have broken ground for him, were good. We can now see that his conceptions of the proper divisions and subdivisions of the Lepidoptera were far truer than those of the writers by whom he was more immediately followed. Whilst Hübner in his life-time

* Reprinted in fac simile by Samuel H. Scudder, Cambridge, U. S. A., 1873.

was obliged to lose, through Treitschke's misapplications, the best part of his work, and suffered the misfortune of being ignored by Boisduval, he yet may have felt "that Time, the unfailing discoverer," would preserve his imperishable thoughts. Hübner's genera now speak for him, dead, whilst Treitschke and his followers will be, perhaps, less honorably remembered.

The results of v. Heinemann's most recent anatomical researches into the structure of the group now known as *Cymatophorinae* (which, however, must apparently receive the name of *Bombyciae*, used by Hübner), compared with the arrangement of Hübner in the Verzeichniss, shows us that in 1816 the group is already circumscribed, the proper genera associated, and, with one or two unimportant changes, the genera those of to-day with other names. In the Tentamen, *Bombycia Or* is made the type of the genus, and to-day the priority of this action must be recognized.

The European species must stand as follows:

Subfamily, **BOMBYCIAE,** *Hübner* (Verz., 1816).

Tribe, PAVIDAE (*Hübner*).

(= *Verae*, Grote.)

A. Eyes hairy; antennae simple:

POLYPLOCA, *Hübner* (1816).

Type: P. xanthoceros, *Borkh.*

Species: ridens (*Fabr.*) (=*xanthoceros*).
flavicornis (*L.*) *Tr.*

B. Eyes hairy; antennae pectinate:

ASPHALIA, *Hübner* (1816).

(=*Scodra*, v. Hein.)

Type: Noctua ruficollis, *Schiff.*

Species: ruficollis (*D. and S.*).

C. Eyes naked; stout species, thickly haired; head sunken; abdomen exceeding the hind wings:

BOMBYCIA, *Hübner* (Tentamen).

Type: Noctua Or (*D. and S.*).

Species: Or (*D. and S.*).
ocularis (*L.*) (=*octogesima*).
diluta (*D. and S.*).

D. Eyes naked; body slender; head not sunken; scantily haired; abdomen not exceeding the hind wings:

TETHEA, *Hübner* (1816).

Type: Noctua duplaris, *Linn.*

Species: duplaris (*Linn.*).
fluctuosa, *Hübner.*

We have seen no North American species of the tribe Pavidae. Mr. Walker has described one from Canada. In the Proceedings of the California Academy of Sciences, October 6, 1873, appears the description of one by Mr. Hy. Edwards. After a careful study of this description we are compelled to think the species erroneously generically determined. No structural points are spoken of, and no comparisons are made with the European species of the group to which it is said to belong.

Treitschke seems to have had a fancy for Hübner's generic names, and has used them without hesitation in his work, but he applied them usually in a totally different sense. He used the generic term "Boarmia" in the place of Hübner's Cymatophora, and in this he has been followed. But what regard for the laws of zoölogical nomenclature can be shown in retaining that name, when the species must, by priority of designation, be referred to Cymatophora?

XXVIII. Determination of Brazilian Sphingidae collected by Mr. Charles Linden

BY AUG. R. GROTE.

[*Read before this Society, February* 15, 1874.]

During a journey on the Amazonas, accomplished last year, Mr. Charles Linden was fortunate in making a large and valuable collection of insects, chiefly Lepidoptera, now incorporated with the entomological collection of this Society. I give in the present paper a list of the Sphingidae, with Mr. Linden's memoranda added in quotation marks. With the exception of Callenyo carinata, there are none of the species which do not seem to be widely distributed.

Aellopos Titan (*Cramer*).

"Santarem; June."

Eupyrrhoglossum Ceculus (*Cramer*).

"September; Rhome's Plantation."

Hemeroplanes Oiclus (*Cramer*).

"Eastern Marajo; August."

Quite distinct from H. pseudothyreus, *Grote*, in the shape of the external margin of the primaries, the straight transverse posterior band and the conformation of the argent discal spots; in color more brownish than in Cramer's figure.

Callenyo chloroptera (*Perty*).

"Rhome's Plantation (forty miles below Santarem); June."

I take this species as the type of the new genus, intermediate between Enyo and Perigonia, and defined as a group by Mr. Walker, C. B. M., Sphing., p. 117.

Callenyo carinata (*Walker*).

"Rhome's Plantation; June."

A second species of the genus and agreeing with Mr. Walker's description. C. carinata presents a resemblance to Pachylia resumens by the banded abdomen, and this is probably remembered by Walker in his observation on the resemblances of Pachylia, page 189, l. c.; while the substance of Mr. Walker's remark has been dissented from by Dr. Clemens.

Philampelus Anchemolus (*Cramer*).

"Para; August; found dead."

The specimen is covered with a singular epiphytous growth, not unlike Cramer's representation on Plate 267, A–B.

Pachylia inornata (*Clemens*).

"Rhome's Plantation; June."

Metopsilus tersa (*Linn.*).

"Rhome's Plantation; August."

Not separable from the United States and Cuban species.

Pseudosphinx tetrio (*Linn.*).

"Santarem; May."

Argeus labruscae (*Linn.*).

"Para; August."

At the late meeting of the American Association at Portland, Prof. C. V. Riley submitted a specimen of this species to me which had been captured in Missouri.

Amphonyx Antaeus (*Drury*).

"Rhome's Plantation; August."

The validity of Professor Poey's genus is impugned without argument by Maasen, Stett. Ent. Zeit, S. 54, 1870. I consider it incontestable. The record of Acherontia Styx or Acherontia Atropos made on S. 55, l. c., from Mexico, must be ascribed to an error in the locality.

Macrosila carolina (*Linn.*).

"Rhome's Plantation; August."

Not separable from the United States and Cuban species.

Macrosila cingulata (*Fabr.*).

"Rhome's Plantation; August."

Not separable from the United States and Cuban species.

Dilophonota Oenotrus (*Cramer*).

Erinnyis Oenotrus, Grote, Sphing. Cuba, p. 44, pl. 2, fig. 3.

"Rhome's Plantation; August."

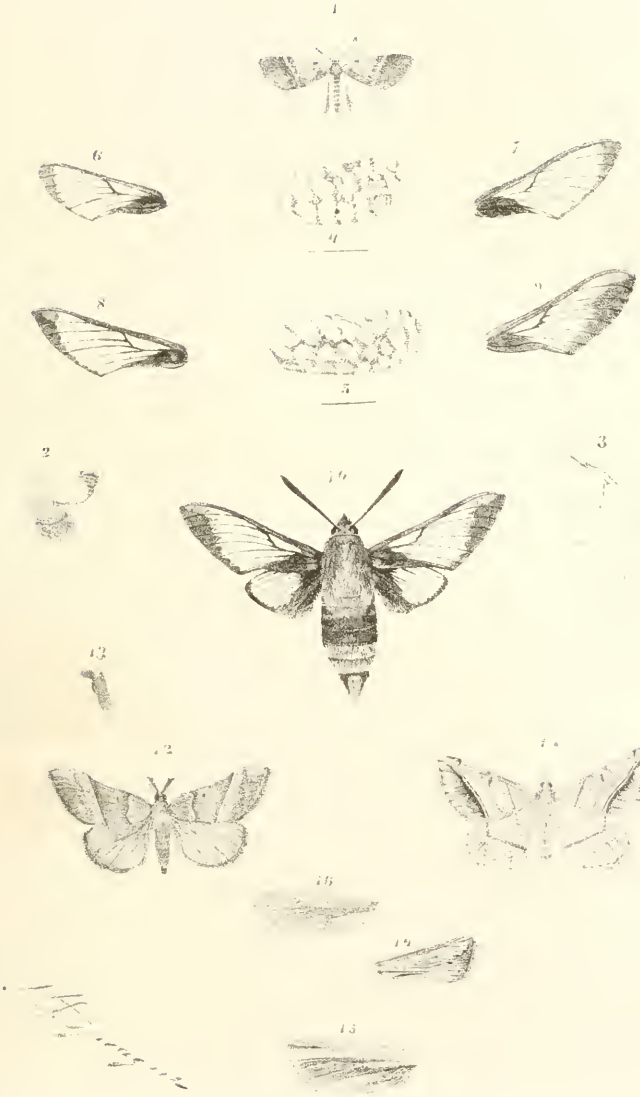
Dilophonota Stheno (*Hübner*).

"Rhome's Plantation; August."

The specimen seems to agree sufficiently with Hübner's fig. 3, but is not well preserved.

ERRATA ET ADDENDA.

Page 6, line 4, for "Plate 2" read "Plate 1."
" 20, after line 13 insert "Massachusets; New York; Pennsylvania."
" 21, " " 6 insert "Type: Dupo jussieuae, *Hübner*."
" 21, " " 22 insert "*Philampelus Linnei*, G. & R."
" 27, to line 13 add "—"
" 27, " 15 add "—"
" 29, line 24, for "this" read "the."
" 46, last line, for "1′ thick" read "1″ thick."
" 47, line 4, for "Heydnum" read "Hydnum."
" 47, " 9, for "hygroyhanous" read "hygrophanus."
" 50, " 31, for "2′–4′ thick" read "2″–4″ thick."
" 53, " 20, for "Heygrocybe" read "Hygrocybe."
" 56, " 34, for "Caraghan" read "Croghan."
" 65, " 18, for "enchinulate" read "echinulate."
" 70, " 20, for ".004′" read ".04′."
" 90, " 4, (foot note) for "unhüllt" read "umhüllt."
" 90, " 5, (do.) for "Penthinen–artigen" read "Penthinenartiger."
" 90, " 6, (do.) for "einen" read "einem."
" 100, " 2, for "Publicatoins" read "Publications."
" 103, after line 6 insert: **Mamestra subjuncta,** *Grote.* *Hadena subjuncta*, G. & R. *Habitat*, Atlantic District.
" 107, line 30, for "remind" read "reminds."
" 110, " 10, dele "*subjuncta*."
" 112, " 11, for "evanida" read "evanidum."
" 112, " 22, for "Ommatospila" read "Ommatostola."
" 116, " 4, for "else all the tibiae without spines," read "else the tibiae without spines; middle and hind tibiae spinose."
" 145, " 1, (foot note) for "Hand" read "Hande."



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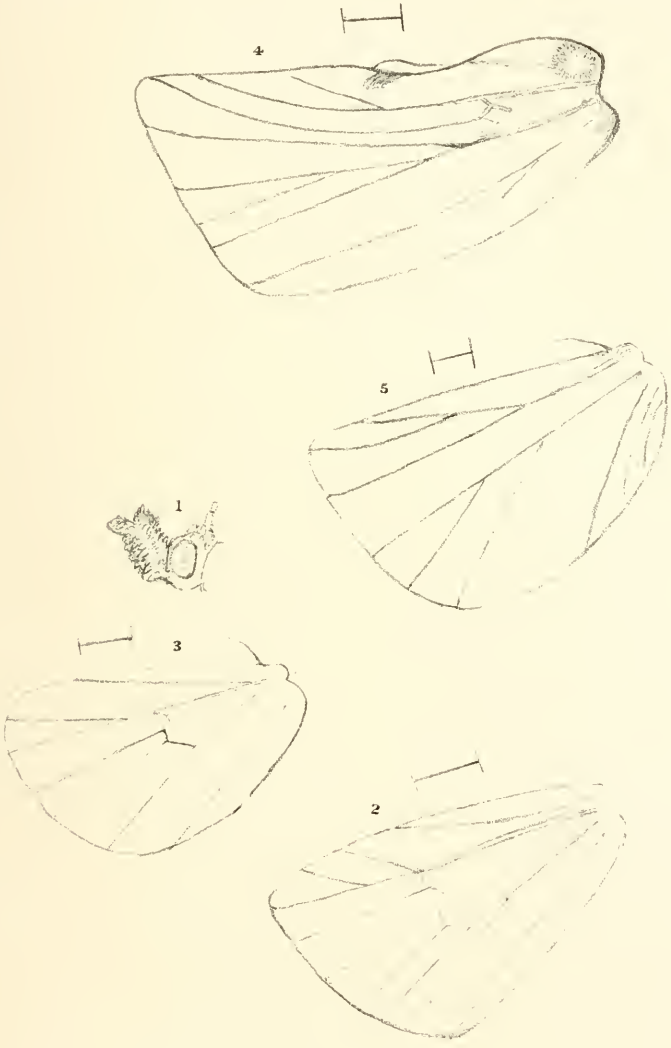

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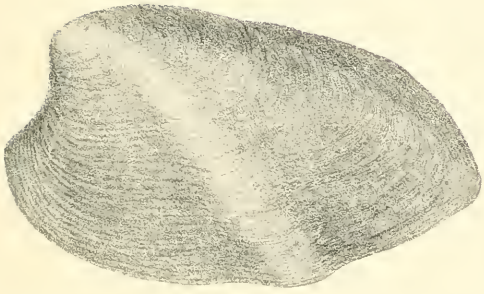


GRAMMYSIA CHEMUNGENSIS.

EXPLANATION OF PLATE VIII.

(*Figures all of natural size.*)

Spirifera Pedroana, *Hartt*, sp. nov., page 237.

1, 4, 5 and 17. Ventral valves of large size. In fig. 4 the dental plates are seen to be rather long.

2, 9, 13, 16 and 18. Ventral valves of medium size.

14. Small ventral valve.

19. Ventral valve, somewhat larger than fig. 14, inclined slightly forward, so as to show the hinge area in part.

8. Hinge area of ventral valve, with the margins of the fissure partly broken away.

3 and 7. Large dorsal valves.

6 and 20. Dorsal valves of medium size.

Spirifera Elizae, *Hartt*, sp. nov., page 239.

15 and 21. Ventral valves. Fig. 21 is the most perfect specimen yet found, while fig. 15 is much broken, and its dental plates are slightly curved.

Spirifera Valenteana, *Hartt*, sp. nov., page 241.

11. An interior mould of the ventral valve, the only specimen of this species obtained.

Rhynchonella (Stenocisma.) dotis, *Hall*, page 246.

10 and 12. Dorsal valves. In fig. 12 the margins of the valve are partially obscured by the rock, in which it is embedded.

(All of the above specimens are interior moulds.)

EXPLANATION OF PLATE VIII.

(Figures all of natural size).

By a mistake of the heliotyper this plate was reversed and numbered backward. The following are the corrected references:—

SPIRIFERA PEDROANA, *Hartt*, sp. nov., page 237.

5, 17, 18 and 21. Ventral valves of large size. In fig. 18 the dental plates are seen to be rather long.

4, 6, 9, 13 and 20. Ventral valves of medium size.

8. Small ventral valve.

3. Ventral valve, somewhat larger than fig. 8, inclined slightly forward, so as to show the hinge area in part.

14. Hinge area of ventral valve, with the margins of the fissure partly broken away.

15 and 19. Large dorsal valves.

2 and 16. Dorsal valves of medium size.

SPIRIFERA ELIZAE, *Hartt*, sp. nov., page 239.

1 and 7. Ventral valves. Fig. 1 is the most perfect specimen yet found, while fig. 7 is much broken, and its dental plates are slightly curved.

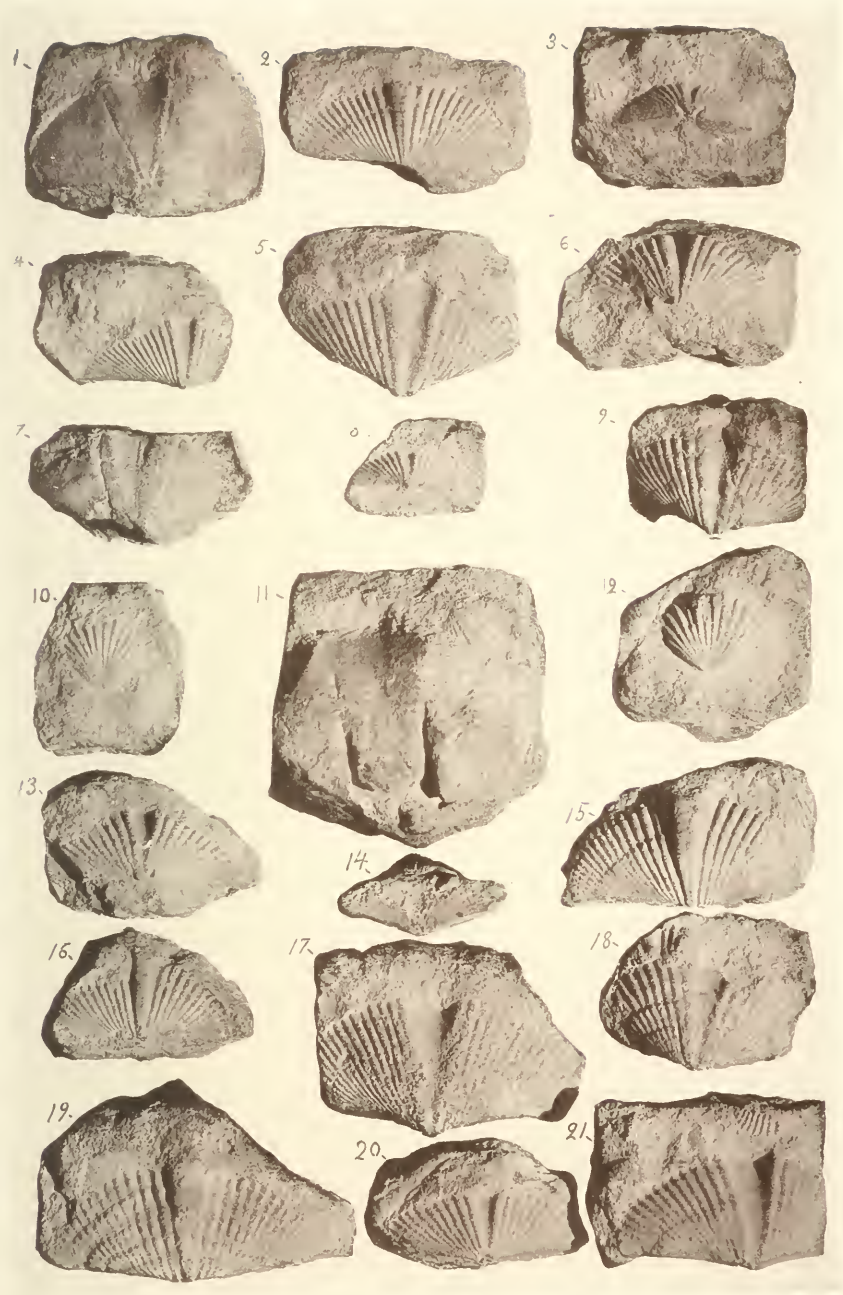
SPIRIFERA VALENTEANA, *Hartt*, sp. nov., page 241.

11. An interior mould of the ventral, valve the only specimen of this species obtained.

RHYNCHONELLA (STENOCISMA,) DOTIS, *Hall*, page 246.

10 and 12. Dorsal valves. In fig. 10 the margins of the valve are partially obscured by the rock, in which it is embedded.

(All of the above specimens are interior moulds.)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EXPLANATION OF PLATE IX.

(*Figures all of natural size.*)

Tropidoleptus carinatus, *Con.,* (sp.,) page 254.

1 and 9. Ventral valves. In fig. 1 the plications are very indistinct.

Vitulina pustulosa, *Hall,* page 255.

2, 7, 8, 12, 13, 15, 20, 21 and 27. Ventral valves. In figs. 7, 8 and 15, there are three medium sized plications on the fold, instead of two large ones.

6, 11 and 32. Dorsal valves. Fig. 11 shows the impressions of the dental plates.

Streptorhynchus Agassizii, *Hartt,* sp. nov., page 248.

10. Small ventral valve, on which the radiating raised lines are well preserved and sharp.

16. Gutta percha impression of an exterior mould of a large ventral valve.

17. Very large ventral valve.

23, 26 and 28. Ventral valves of medium size.

3. Dorsal valve, medium size.

4, 25 and 29. Rather large dorsal valves.

30. Interior and exterior moulds of small dorsal valves, with the raised lines sharply preserved.

Chonetes Comstockii, *Hartt,* sp. nov., page 250.

5, 14, 18, 19 and 31. Ventral valves.

Spirifera Elizae, *Hartt,* sp. nov., page 239.

22. Fragment of ventral valve, from the dental plate of left side to left cardinal extremity.

Chonetes .....? *Hartt,* sp. nov., page 253.

24. A ventral valve, the only specimen found.

(Unless otherwise stated, the above specimens are all of interior moulds.)

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EXPLANATION OF PLATE X.

(*Figures all of natural size.*)

Cyrtina? Curupira, *Rathbun,* sp. nov., page 242.

1 and 6. Dorsal valves.

Retzia Wardiana, *Hartt,* sp. nov., page 245.

3, 4, 5, 8, 11, 12 and 14. Ventral valves.

16. Ventral valve, with the plications finer and more numerous than in the majority of specimens.

2 and 9. Dorsal valves.

Orthis Nettoana, *Rathbun,* sp. nov., page 247.

7 and 13. Ventral valves.

10. Dorsal valve.

Terebratula Derbyana, *Hartt,* sp. nov., page 236.

15, 18, 24 and 25. Ventral valves.

17, 19, 21 and 22. Dorsal view of specimens of which both valves are preserved. The beaks of the ventral valves are seen extending beyond the dorsal valves, but in all the specimens they are more or less defective.

20. Dorsal valve.

Tropidoleptus carinatus, *Con.,* (sp.,) page 254.

26. Exterior mould of dorsal valve, very much broken.

Retzia Jamesiana, *Hartt,* sp. nov., page 243.

29, 33, 34, 36, 37 and 38. Ventral valves, showing the enlarged median depression.

27, 28, 31, 32 and 35. Dorsal valves.

30. View of dorsal valve of a specimen in which both valves are preserved. The beak of ventral valve is slightly extended beyond the dorsal valve.

23. Dorsal view of a rather narrow specimen, of which the ventral valve is also preserved. The plications are less in number than usual.

Chonetes Herbert-Smithii, *Hartt,* sp. nov., page 251.

39, 41, 42 and 46. Ventral valves of ordinary size.

44. Ventral valve, same as above, but smooth from the character of the rock in which it occurred.

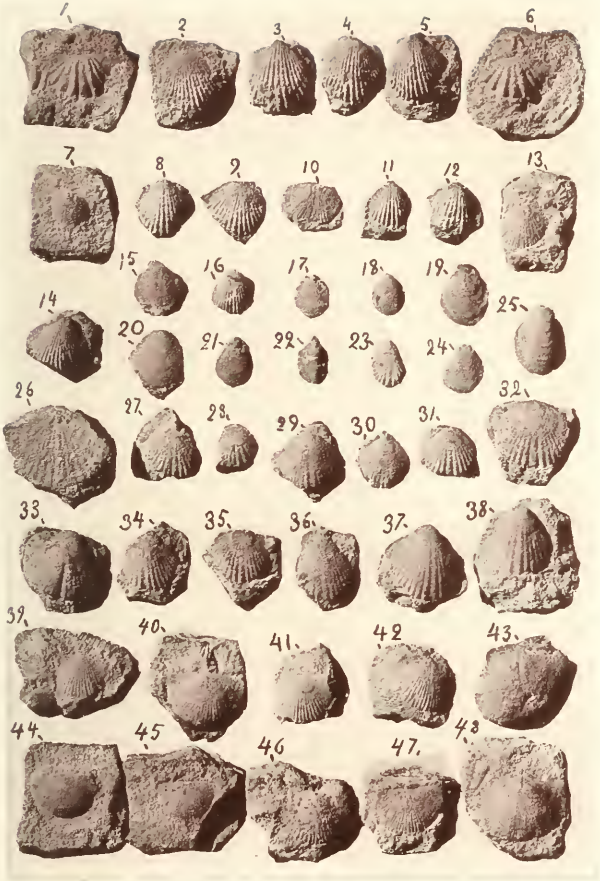
40. Ventral valve, rather above the average size.

45 and 47. Exterior moulds of dorsal valves.

Chonetes Onettiana, *Rathbun,* sp. nov., page 253.

43 and 48. Ventral valves, with nearly smooth surfaces and showing the short median septum very distinctly.

(Except where otherwise stated, the above specimens are all of interior moulds.)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10. Hemaris marginalis.
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14. Acronycta ovata.
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[Explanations to Plates VIII. to X. face the Plates.]

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